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Multilevel Pathways to Patient-Centered Care

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Multilevel Pathways to Patient-Centered Care

by

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Abstract

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Patient-centered care represents a paradigm shift for healthcare as the field undergoes massive restructuring to align health services delivery systems with the health of the patient as conceptualized by the biopsychosocial model rather than the biomedical model. As paradigm shifts cannot be implemented in a piecemeal manner, members within healthcare organizations are at risk of initiative fatigue. To understand how to facilitate the implementation of patient-centered care, this dissertation consists of three papers addressing factors that impact patient-centered care at macro, meso, and micro levels. The first paper, "Patient-Centered Culture at Physician Practices During Interconnected Changes in Ownership, Size, and Specialty Mix," was the first large, longitudinal study to simultaneously assess the effects of changes in size, ownership, and specialty mix on practices' use of strategies to improve responsiveness to patients using difference-in-difference regression. Increases in practice size, rather than changes in ownership or specialty mix, were associated with decreased patient responsiveness. The implication is that modular organization designs may mitigate the risk of decreased patient-centeredness when practices transition ownership from physicians to systems. The second paper, "Primary Care Team Participation and Patients' Experience of Chronic Illness Care," uses hierarchical linear regression to examine the relationship between participatory communication among interprofessional primary care team members and patients' experiences of chronic illness care. Rather than a synergistic relationship as hypothesized, the results indicate that more participatory communication among team members does not translate into better patients' experiences of chronic illness care. For the third paper, "Patient Activation as a Pathway to Shared Decision-making among Adults with Diabetes or Cardiovascular Disease," cross lagged panel models are used to estimate asymmetries in the bidirectional relationship of patient activation and patients' experiences of shared decision-making among adults with diabetes and/or cardiovascular disease. Patient activation has a much stronger impact on patients' experiences of shared decision-making than the reverse. The implication is that primary care practices should target shared decision-making interventions at activated patients, while prioritizing patient activation among patients with low activation. In conclusion, patient-centered healthcare might be best conceptualized as a complex adaptive system. People must be empowered to make decisions when their local circumstances are too complex for centralized control and information must be shared in the process to ensure efficient adaptation. The primary role of healthcare organizations in such a context is to establish guiding principles and enabling structures. Practice and research implications are discussed within this framework of healthcare as a complex adaptive system.

Dedicated to

any of us who have ever felt unseen, unheard, afraid, or alone.

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“We shall not cease from exploration and the end of all our exploring will be to arrive where we began and know the place for the first time.” – T.S. Eliot.

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CHAPTER 1

Introduction: Patient-Centered Care as a Paradigm Shift

HISTORY

The idea of patient-centered care arose in the 1980s in reaction to the biomedical model of disease. The biomedical model, with its roots in Louis Pasteur's germ theory, focused on the biological basis of disease and has been hugely successful in the treatment and prevention of infectious diseases. Life expectancy in the United States increased from 47 years in 1900 to 74 years in 1980 (Murphy, 2000; National Center for Health Statistics, 1984). Due to its success, the biomedical model came to dominate the medical field. However, its success eventually reached a limit. The biomedical model contributed to the physician's professional dominance of medicine even while patients and physicians grew alienated from one another (Freidson, 1974). With the successful eradication of many infectious diseases, the rate of non-communicable diseases also steadily increased. The leading causes of death in 1900 were pneumonia, influenza and tuberculosis, accounting for 23% of all deaths, while these same diseases only accounted for 2% of deaths in 1980 (National Center for Health Statistics, 2000).

The Picker Institute was the first to use the phrase "patient-centered care" in advocating for a more holistic version of care (Gerteis, Edgman-Levitan, Daley, & Delbanco, 2002). The National Academy of Medicine later elaborated that patient-centered care is care that is responsive to individual patient preferences (National Academy of Medicine, 2001). Eventually, shared decision-making was recognized as a key element of patient-centered care (National Academy of Medicine, 2014) where the patient participates actively in their own care. The patient collaborates with the physician as equals in medical decision-making, guided by the patient's determination of the relative harms and benefits of various options, as informed by the physician.

This new vision of care represents a paradigm shift for the field, challenging both the biomedical model of disease and the whole history of the patient-physician relationship. Except for a brief period in the 18th century, the relationship between the patient and physician has always been one of paternalism (Kaba & Sooriakumaran, 2007). Accordingly, the ultimate guiding principle has been that famous Hippocratic oath, "Do no harm." This principle, embedded in the cultural bedrock of medicine, presupposes that physicians are the ones in a position of authority to determine what would do more or less harm.

Despite the challenge that such a paradigm shift presents, patient-centered care shows considerable promise for tackling the specific challenges of our time. Patient activation, for example, is an aspect of patient-centered care that involves engaging the patient to take charge of their own health. This has been found to be very effective in chronic care management (Frosch, Rincon, Ochoa, & Mangione, 2010; Judith H. Hibbard, Mahoney, Stock, & Tusler, 2007; Maly, Bourque, & Engelhardt, 1999). As a majority of elderly adults in the United States have at least one chronic disease (Frosch et al., 2010) and as the "baby boomer" generation ages into this population, patient-centered care will become crucial in managing the country's health needs (Thomas Bodenheimer, 2006; Thomas Bodenheimer, Chen, & Bennett, 2009).

Despite considerable interest in patient-centered care and its many documented benefits, this strategy has made very little headway with most healthcare organizations. There have been a multitude of training programs and communication guides for shared decision-making (Bieber et al., 2008; Glyn Elwyn et al., 2012; Legare et al., 2012, 2010; Stacey et al., 2008). Despite this literature, less than 10% of medical decisions meet the minimum standards for informed decision-making in at least one study of more than 1000 office visits in which more than 3500 medical decisions were made (Braddock, Edwards, Hasenberg, Laidley, & Levinson, 1999).

The reasons for this halting implementation are manifold. Physicians can be skeptical about the appropriateness of patient involvement measures in various contexts (Cabana et al., 1999; Caldon et al., 2011; G. Elwyn, Edwards, Kinnersley, & Grol, 2000). Physicians may disagree with each other as well as their patients about which conditions are preference sensitive. For example, some oncologists may believe that prostate cancer should always be treated with surgery whereas other oncologists believe that there is a choice to be made between surgery, radiation therapy and active surveillance. When oncologists believe that there is only one valid treatment for a condition, there is no choice to be made and hence no preferences to be assessed. Patients do not need to be asked which side effects they are more concerned about or whether they would be stressed by the thought of living with untreated cancer.

Even when physicians want to involve their patients though, they often have a difficult time determining which of their patients would be receptive to shared decision making (Bruera, Sweeney, Calder, Palmer, & Benisch-Tolley, 2001; Cox, Britten, Hooper, & White, 2007). There is also a pervasive worry that engaging patients in nuanced discussions of the uncertainties of treatment options can be excessively time-consuming (G. Elwyn, Edwards, & Kinnersley, 1999; Ford, Schofield, & Hope, 2002; Friedberg, Busum, Wexler, Bowen, & Schneider, 2013; Legare, Ratte, Gravel, & Graham, 2008) and stressful for the physicians as well as their patients (G. Elwyn, Edwards, Gwyn, & Grol, 1999). Physicians oftentimes feel that it is part of their duty to provide the patient with a façade of certainty when they are navigating the medical world and that patients would be disturbed to learn of less-than-certain outcomes from various treatments.

However, many patients would appreciate being alerted to these uncertainties, especially when they concern a major medical decision (Mansell, Poses, Kazis, & Duefield, 2000; Mazur & Hickam, 1997). This may be not readily apparent to physicians as patients are wary of engaging in shared decision making primarily for fear of damaging their relationship with their physician (Frosch, May, Rendle, Tietbohl, & Elwyn, 2012). In explaining their silence, patients often cite worry of being labeled a difficult patient by their physician for questioning their judgment or asking for alternatives (Fraenkel & McGraw, 2007).

More broadly, however, these concerns reflect the struggle of challenging an existing cultural script for the relationship between patients and physicians and their respective roles in interaction. Standards of behavior, especially across a power differential such as in a patient-physician relationship, operate under shared assumptions as part of the cultural context. Because culture dictates the ways in which we communicate respect, trust, and competence, it

can be difficult to challenge these assumptions even when we are aware of them. We present here a theoretical model of organizational culture to motivate our conceptual model of patient-centered care and our resulting empirical approach.

CULTURE

There exists a vast and contentious literature on culture with more than a hundred different definitions of the word (Untereiner, Kroeber, & Kluckhohn, 1952). These disagreements highlight the fact that scholars of culture are a highly interdisciplinary group with many different needs and hence many different ideas about a functional definition of culture that can be effectively operationalized. Even in organizational theory alone, there is a rich literature on the many possible dimensions of organizational culture (Hofstede, Neuijen, Ohayv, & Sanders, 1990; Martin, 1992; Trice & Beyer, 1993).

Out of this literature, the competing values framework has emerged as a one approach that synthesizes many of these different approaches. Under this framework, organizations are categorized as clans, hierarchies, adhocracies or market organizations based on their interval vs external focus and their emphasis on stability vs flexibility as defined by competing values in their dominant characteristics, organizational leadership, management of employees, organizational glue, strategic emphases and criteria of success. However, while the competing values framework is a powerful schema for understanding organizations in many different industries, it is not quite suited to the specific task of differentiating between biomedical culture and patient-centered culture. The competing values framework defines the values of the organization and the roles of its leaders, managers and employees but the primary difference between a patient-centered organizational culture and a biomedical organizational culture is the conception of the patient. This change may be more readily facilitated by one of the archetypes described by the competing values framework. As patient-centered care becomes a widely accepted model of care, for example, organizations that are externally focused may seize on the idea as a way to remain competitive. Further, because patient-centered care requires a change from the traditional approach, organizations that value flexibility over stability may be more amenable to the idea. However, patient-centered care is not defined by either of these criteria.

Rather, we propose a modified version of Schein's three-part model of organizational culture (Schein, 2010). Schein's model consisted of explicit behavior, espoused beliefs and underlying values. Because we are interested in how cultures determine and are determined by interaction, we consider the act of espousing belief to fall under explicit behavior. We follow Schein's conception of culture as a symbolic interactive system but focus on the interaction of having and fulfilling expectations. More specifically, organizational culture is a shared belief system about what values are important in a particular organization and how those values are expressed in behavior by different members of that organization in their various roles. It is what you do because you believe that it is expected of you and what you expect of others in turn. Since we only observe behaviors and not values, this belief system becomes a way for people to project assumed values on one another based on their behavior. The system is affirmed every

time a behavioral expectation is fulfilled even though the true values that motivate those behaviors can be decoupled from the assumed values.

As an example, a patient and physician may both be eager to engage in shared decision-making but unable to break through to the shared understanding necessary for that to happen. If the physician has been historically socialized to make decisions and provide assurance as demonstrations of a competent physician, sharing uncertainty around outcomes and side effects may be a vulnerable moment for the physician. The patient likewise may believe that demonstrating respect in their role as a patient means following the physician's lead, which makes it difficult for them to share their concerns. Note that this is true even if the patient and physician do not hold these first order beliefs about their own roles but second order beliefs about each other. That is to say, they act according to the roles that they expect each other to expect of themselves.

Culture, in this way, are a subset of norms. Norms are shared beliefs about how various members of a society should behave. Culture are shared beliefs about how various members of a society should behave *as a reflection of the values that they hold*. As an opt cited example of a norm, everybody in the United States drives on the right side of the road. There is no value attached to this behavior. It is a behavioral expectation that simplifies coordination. By contrast, culture is a set of norms that derives from an underlying value system. It is the values underlying these behaviors that make cultural change so difficult because culture, as a belief system, include moral judgments about the morally correct way for people to communicate.

If the physician invites the patient to participate in shared decision-making, the patient may be suspicious of the invitation but nevertheless agree. According to the standard cultural script in the United States, a patient would be expected to show respect for her authority by agreeing to the plan. The patient and physician's agreement to share in decision-making does nothing to challenge the underlying assumptions about the patient and physician's roles and the rules of interaction between them. A bit of kabuki then occurs in which the patient pretends to engage in shared decision-making while attempting to elicit the physician's own preferences, guessing at the "right" answer. The physician might interpret this behavior as indicative of the patient's reluctance to engage in shared decision-making and, because they are both feeling vulnerable, rapidly revert to the paternal model. The attempt fails because the underlying expectations are untouched.

While these systems are difficult to change, they do serve a useful purpose. A shared culture operates functionally as a way for us to predict one another's thoughts, feelings and behavior. This decreases uncertainty in our interactions while also decreasing the need to communicate. Communication is an attempt to understand another's perspective well enough to add to that perspective. With enough of a common understanding, many of our expectations can go unsaid and we can still coordinate efficiently. We don't need to micromanage or check in on every single decision because we can predict with reasonable certainty what the other person will think or do, allowing us to smoothly act in anticipation of one another. Culture can then be considered a heuristic in that it simplifies decision-making. Like all heuristics, it may be very

useful in a broad range of situations but becomes problematic if applied too vigorously without consideration of context. This is particularly concerning as culture often become an unconscious and inflexible habit when everybody that we meet in an organization or an industry all share the same expectations. We come to believe not just that certain values generate certain behaviors in certain roles but that certain values *deterministically* generate certain behaviors in certain roles. That is, we come to believe that the culture we operate within is the only way to think and act.

Where certain cultures interact frequently, a pseudo-expansion may occur. In working or living with other cultures, we develop a sense of other people's patterns of behavior. Our knowledge is incomplete as we do not have access to the underlying values that generate these behaviors but even without sharing expectation of a particular value, we know what to expect behaviorally. It may thus be possible to build more nuance into existing bodies of expectation for how people of different backgrounds interact. This helps to coordinate our activities within a constrained context. If occupational norms are strong, for example, interdisciplinary teams can be assembled and reassembled at a moment's notice. They know what to expect from one another based on standardized training and occupational stereotypes so they can function without a deep knowledge of one another's history, environment and preferences.

Healthcare organizations take a similar approach to patients. Many insurance companies provide case managers for high cost patients but the majority of patients still experience their insurance company as a bureaucratic labyrinth with no consistent point of contact. It is expected that most patients can be processed through standard protocols with minor attention to individual context. This might well be an efficient process for certain classes of medical needs but it also serves to reinforce, from organizational policies to the patient's internalized beliefs, that a patient's role is to be a passive recipient of care.

Given the pervasiveness of the passive patient assumption in the health system, simultaneous interventions must be considered at all levels. If a physician invites a patient to take an active role in their healthcare but the organizational policy excludes patients from the design of that care, they receive conflicting messages about what it means to be a patient. Given rising patient dissatisfaction with the medical system when patients have been relegated to a passive role for hundreds of years, calls for patients to take on greater responsibilities may come across as disingenuous or facetious. If patients cannot trust that the offer is sincere, they are liable to revert to a passive role. Trust is an essential element to organizational change (Vakola, 2013) and integrity one of the key factors to building trust (Mayer, Davis, & Schoorman, 1995). Yet a system cannot change all at once, overnight. Initiative fatigue may exacerbate rising rates of physician burnout when the demand for physicians already far exceed the supply (Shanafelt et al., 2015). Rather than piling on patient-centered care initiatives one after another, it is crucial that we understand how different initiatives might build on or take from one another. To that end, we use the organizational culture framework to describe a conceptual model of patient-centered care.

CONCEPTUAL MODEL

Previous authors have variously organized the concepts of patient-centered care into principles, enablers, activities, tenets, components, dimensions, etc. (Jayadevappa & Chhatre, 2011; Saha, Beach, & Cooper, 2008; Scholl, Zill, Härter, & Dirmaier, 2014; Stewart, 2003). For our purposes, we distill these concepts into actors, settings and roles.

The characters of patient-centered care include at minimum the patient and the physician. Other characters such as nurses, home health workers, case managers, etc. may be included for a more comprehensive model. Depending on the level of analysis, organizations such as teams, hospitals and insurance companies might be considered either characters or settings.

The patient is by definition the central character in patient-centered care. This character is defined by the biopsychosocial model in terms of their clinical characteristics, their internal state, and their external situation. Their role is to be an active participant in their own care. This definition of the patient and their role are the primary changes to the healthcare model from which all else follows. The inclusion of their internal state and external situation gives the patient many more responsibilities as the only person who has access to certain information and behavior essential to their health. It also brings specialists such as social workers closer to the center.

This conception of the patient impacts the way in which members of the health system interact with the patient as well as one another. Team members at a clinic might work more collaboratively, for example, to apply their skills in managing different aspects of a patient's wellbeing. While the health system pursues these goals for the patient's sake, it also has the responsibility of empowering the patient to realize their role as an active participant. This conception of the patient's role impacts the health organization as well. To facilitate a bidirectional information flow, for example, organizational structures, policies or services could be implemented. This might include patient portals, protocols around quality assurance, etc. All these changes ripple out from the central change of reconceptualizing the patient and their role in healthcare.

This gives us a direct avenue into evaluating patient-centeredness. Patient-centered care depends on changing the patient's defining characteristics and sanctioned role as perceived by the patient themself and everybody else within the system. A cultural analysis might examine these perceptions directly. In this work, we examine proximates of these perceptions and how they relate to shared decision-making as a core element of patient-centered care.

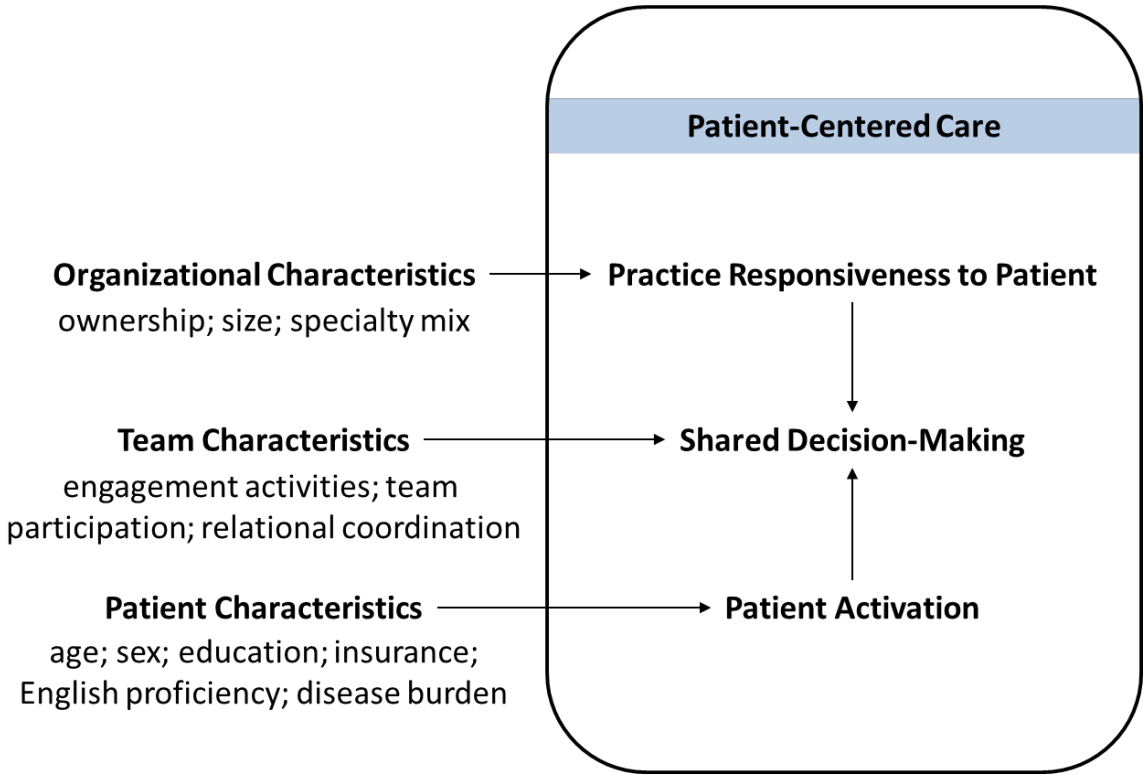


Figure 2. Conceptual model of patient-centered care as a multi-level construct.

We approach this problem at three levels. First, the organization's perception of the patient's role as an active participant is reflected by the organization's responsiveness to the patient's concerns and suggestions. So we examine the association between organizational characteristics and the practice's responsiveness to patients as a macro facet of patient-centered care. Then, controlling for this practice responsiveness to patients, we examine the association between team participation and the patient's assessment of chronic illness care including their perception of shared decision-making, a meso facet of patient-centered care. Last, the patient's self-perception as an active participant is reflected by their activation i.e. the degree to which a patient feels responsible for their own health. So we evaluate the relationship between patient activation and shared decision-making. In this way, we hope to arrive at a multilevel perspective on pathways to patient-centered care.

We aim to answer these three questions in particular:

1. How do changes in ownership, size, and specialty mix impact patient-centered culture at physician pratices?
2. Is higher participation among primary care team team members associated with better chronic illness care, including shared decision-making?
3. Does patient activation precede shared decision-making?

CHAPTER 2

Macro: Patient-Centered Culture at Physician Practices During Interconnected Changes in Ownership, Size, and Specialty Mix

Co-authors: Stephen M. Shortell, Hector P. Rodriguez.

INTRODUCTION

Medical practices in the United States are increasingly falling into one of two divergent types: small, single specialty practices owned by physicians and large, multi-specialty practices owned by systems (Burns, Goldsmith, & Sen, 2013). The trend toward increased system ownership (Kocher & Sahni, 2011; Liebhaber & Grossman, 2007) has many potential benefits. System ownership may improve a practice's bargaining power with payers resulting in potentially greater resources for administrative structures and support. System ownership can also improve quality of care by providing a coordination framework and improve efficiency by reducing transaction costs (Mick & Shay, 2016). Further given the implementation of the Medicare Access and Children's Health Insurance Program Reauthorization Act of 2015 (MACRA), physicians will be looking to systems for the infrastructure resources needed to succeed under the new value-based payment incentives. There is concern, however, that as physician owned practices are acquired by hospitals and health care systems, patient centeredness will diminish, as system-driven improvement initiatives will emphasize acute inpatient care at the expense of patient-centered ambulatory care (Halley, 2014). For example, systems ownership has been found to be associated with decreases in physician engagement, which can compromise quality of care (Keckley, Coughlin, & Stanley, 2013). However, health care systems are met with many more compliance demands from accrediting bodies such as the Joint Commission and payers of health care, such as the Center for Medicare and Medicaid Services. These demands include the establishment of a formal system for receiving, documenting and responding to patient complaints (Centers for Medicare & Medicaid Services, 2004; Organizations, 2000). This might carry over to hospital owned ambulatory primary care practices being more responsive to patients than physician-owned practices.

To date, studies of the effect of systems ownership on organizational performance have yielded mixed results. In a cross sectional study of California physician practices, system ownership was found to be associated with higher adjusted costs per patient compared to physician ownership (Robinson & Miller, 2014). In another cross-sectional study of a national sample of small and medium sized practices (19 physicians or less), system owned practices had broader use of patient-centered medical home (PCMH) processes, e.g. electronic medical records, quality improvement initiatives, nurse care managers (Rittenhouse et al., 2011). In a longitudinal study of a national sample of physician practices of all sizes, Bishop et al found that practices which switched to hospital ownership had more chronic care management processes (CMPs) which are core PCMH processes (Bishop, Shortell, Ramsay, Copeland, & Casalino, 2016) and important to support the delivery of patient-centered care (Wiley et al., 2015). However, Scott et al found no evidence of improved patient care in four quality metrics when hospitals switched to an employment model with their physicians in a national, longitudinal study of acute care hospitals (K. W. Scott, Orav, Cutler, & Jha, 2017). We seek to expand on this literature by investigating the impact of ownership on practice strategies to respond to patient concerns and feedback because an organization's orientation to patients, particularly the extent to which patients' needs are proactively assessed, may be more likely to be impacted by ownership changes compared to other PCMH processes or utilization.

Examining the impact of practice ownership is challenging because transitions to system ownership also involve increases in practice size and changes in specialty mix, which may have independent impacts on practice strategies and organizational performance. Previous studies have not distinguished between the relative impacts of changes in practice ownership and associated changes including increased practice size and specialty composition on the quality and efficiency of health care. Increased practice size can improve operational efficiency by allowing physicians to pool resources, negotiate with payers and distribute risk from variations in volume and complexity in the patient population (Besanko, Dranove, Shanley, & Schaefer, 2009; Shortell et al., 2005). However, the benefits of increasing size are limited, as communication and coordination have been found to suffer with increasing size (Wheelan, 2009). Changes in specialty composition may also affect quality of care as multispecialty groups are challenged to coordinate care for complex cases. While there is the potential for improved care coordination in health care systems (Mehrotra, Epstein, & Rosenthal, 2006; Rittenhouse, Grumbach, O'Neil, Dower, & Bindman, 2004; Rodriguez, Von Glahn, Rogers, & Safran, 2009), prior studies have find mixed evidence of decreased costs among multispecialty groups compared to single specialty groups (Pauly, 1996). As multispecialty groups have been found to be structurally complex (Kralewski, Pitt, & Shatin, 1985), care coordination and practice responsiveness may also decrease with increased diversification of services.

To advance evidence on the impact of physician practice transitions to system ownership, we use a national cohort of physician organizations to disentangle the relative association of practice ownership, size, and specialty composition on the extent to which practices report the use of strategies for responding to patient concerns, feedback, and developing new services.

METHODS

Data

Three nationally representative surveys of physician organizations were linked- the National Study of Small and Medium-sized Physician Practices (NSSMPP) and waves 2 and 3 of the National Survey of Physician Organizations (NSPO2 and NSPO3). These surveys focus on medical practices that provide care for patients with at least one of four chronic conditions: asthma, congestive heart failure, depression and diabetes. These surveys consisted of 40-minute interviews with the person most knowledgeable about the processes of the practice, usually the medical director, president or chief executive officer. NSSMPP focused on practices with 19 or less physicians while NSPO2 focused on large practices with 20 or more physicians. These two surveys were conducted in 2006 (NPSO2) and 2008 (NSMPP) and served as the baseline for our study. NSPO3 sampled practices of all sizes nationally, in 2012 and 2013 and serves as the follow-up period for the study. These surveys have been previously described elsewhere (Rodriguez et al., 2016; Shortell et al., 2009; Shortell, Wu, Lewis, Colla, & Fisher, 2014).

Analytic Sample

There were 557 practices that responded to the NSPO2 survey (60.3% response rate), 1,931 practices that responded to the NSSMPP survey (63.2% response rate) and 1,398 practices that responded to the NSPO3 survey (49.1% response rate). We were interested in analyzing a cohort of practices longitudinally, so we focused on 1,048 practices that had both baseline and follow-up survey responses. We were interested in physician ownership compared to systems ownership, so we excluded 104 practices that were owned by community health centers at either or both time points. Finally, we excluded 47 practices that were missing key variables for this study. The final analytic sample includes 897 physician organizations.

Measures

Systems ownership is defined as ownership by a hospital, hospital system, healthcare system, health management organization, or insurance entity. Because we are interested in the impact of change in ownership over time, we distinguish between practices that were continuously physician owned (n=703), continuously system owned (n=86), physician then system owned (n=83), and system then physician owned (n=25). We were also interested in the impact of practice size, which was categorized as small (1 to 2 physicians), medium (3 to 19 physicians), and large (20 or more physicians). A change in practice size was accordingly defined as an increase or decrease in number of physicians that resulted in a change in size categories. Specialty composition was categorized as 100% primary care practitioners (PCP), 33% to 99% primary care practitioners, or less than 33% primary care practitioners. A change in specialty composition was likewise defined as an increase or decrease in the percentage of primary care practitioners that resulted in changes in specialty mix categories.

A composite measure of practice-reported patient-centered culture (PCC) was constructed using practice-reported responses to five questions adapted from the Malcolm Baldridge National Quality Award criteria (α = 0.76)(Shortell et al., 2004). The questions assessed the extent to which 1) the practice does a good job assessing patient needs and expectations, 2) the staff promptly resolves patient complaints, 3) patient complaints are studied to identify patterns and prevent reoccurrence, 4) practice uses data from patients to improve care, and 5) practice uses data on patient expectation and satisfaction to develop new services. Answers to each of these statements ranged from strongly disagree (1) to strongly agree (5) for a final average score on PCC that likewise ranged from lowest (1) to highest (5). The focus here is the practice's use of responsive strategies for addressing patient complaints and feedback as opposed to the patient-centeredness of care, as reported by the patients.

We further included NSPO3 data on the percent revenue from Medicaid patients as a proxy for patient socioeconomic vulnerability, the care management process index since this can contribute to PCC regardless of ownership, and the Herfindahl-Hirschman Index as calculated from the American Hospital Association Annual Survey of Hospitals ("AHA Annual Survey | American Hospital Association's Annual Survey Database | AHA Data Online," n.d.; Connor, Feldman, Dowd, & Radcliff, 1997; Cuellar & Gertler, 2003; Spang, Bazzoli, & Arnould, 2001) to account for county-level hospital competition for 2009, the closest available year of data to the physician practice survey date, to account for heterogeneity in market environments.

Statistical Analyses

First, for each of the model variables, ownership categories were compared to the reference category of continuously physician owned practices. We used Wilcoxon rank-sum test for categorical variables and Fisher's exact test for continuous variables (Table 1).
Then, to examine the association of ownership changes and changes in PCC, multivariable linear regression models were estimated, controlling for practice size, specialty composition, proportion Medicaid revenue, care management processes (CMP) index, PCC at baseline, and market competition, near baseline in 2009. Because ownership change may be accompanied by changes in these control variables, analyses also controlled for change in practice size, change in proportion PCP, change in proportion Medicaid revenue, and change in the CMP index.

We also examined the impact of ownership status on the change in in use of each of the 5 individual PCC items in regression analyses. Because change in the use of individual components is dichotomous, we classified these changes as improvements (positive change) or not (negative change or no change) and multivariable logistic regression models were estimated using the same control variables as our main model.

We anticipated that some control variables might be highly correlated, so the variance inflation factor (VIF) was calculated for each control variable to assess the extent to which the multivariable models were overfit using a criterion of VIF$\leq$ 2.0.

Sensitivity Analyses

Change over time analyses with two points-in-time can be susceptible to floor or ceiling effects (J. Nunnally & Bernstein, 1978). As a result, we repeated the analysis excluding practices with baseline PCC scores at the minimum of 1 or the maximum of 5. We adjust for the baseline CMP index and in change over time in the CMP index to account for a potentially confounding effect on estimating the association of ownership change and PCC. However, the ownership effect of interest may be attenuated with these controls because the use of care management processes may provide a foundation for practices to implement strategies to improve patient responsiveness because patients with chronic conditions can provide helpful information for improving practice responsiveness to patients. As an additional sensitivity analysis, we removed the CMP control variable from our models to assess whether the effect size for ownership status changed substantially.

RESULTS

Descriptive Statistics

Practice characteristics are shown in Table 1. Compared to practices that were physician-owned at both baseline and followup, practices that transitioned from physician ownership to system ownership were more likely to increase in size (6.7% vs 24%, p<0.0001) and more often

decreased in their proportion of PCPs (8.8% vs 18%, p=0.038). However, compared to practices that were continuously physician-owned, practices that switched from physician-owned to system-owned did not have significantly different PCC at baseline (median = 4.2, interquartile range (IQR) = 3.8, 4.6 vs median = 4.2, IQR = 3.6, 4.6, p = 0.3) and continuously system-owned practices had significantly lower PCC at baseline (median = 4.2, IQR = 3.8, 4.6, vs median = 4.0, IQR = 3.6, 4.4, p=0.013).

Adjusted Analyses

Results of the multivariable linear regression are shown in Table 2, where a positive coefficient indicates an increase in PCC and a negative coefficient indicates a decrease in PCC. In adjusted analyses (Figure 1), a transition from physician ownership to system ownership was associated with increased PCC (β = 0.31, 95% CI = 0.05, 0.57, p = 0.018). Decreases in the proportion of PCPs and increases in practice size were associated with declines in PCC (β = -0.25, 95% = CI -0.36, -0.14, p < 0.0001; β = -0.38, 95% CI = -0.51, -0.25, p < 0.0001, respectively).

When we examined each of the PCC components individually using multivariable logistic regression, results were mostly consistent. Changing from physician ownership to systems ownership was still positively associated with improvements in PCC components where statistically significant. The relationship between PCC components and decreases in proportion PCP, however, was not robust. Analyses of individual PCC components revealed that system ownership was primarily associated with improved PCC primarily due to improved assessment of patient needs (odds ratio (OR) = 17.88, 95% CI = 2.50, 127.77, p = 0.005), though we also found that system ownership was associated with practices having systems to promptly resolve patient complaints (OR = 3.88, 95% CI = 1.02, 14.82, p = 0.047) and whether practices studied patient complaints to identity patterns (OR = 6.56, 95% CI = 3.35, 31.89, p = 0.021). Furthermore, while the effect of increasing practice size on overall PCC was negative and statistically significant, the relationship was almost entirely driven by the decreased likelihood of larger practices to use data from patients to develop new services. This is the only PCC item for which the relationship between increased practice size and PCC was negative and significant (OR = 0.25, 95% CI = 0.07, 0.87, p = 0.023). Control variables in our final models all had variance inflation factors less than 2.0, indicating that collinearity was not a concern.

Sensitivity Analyses

While we were concerned about potential ceiling or floor effects impacting the level of over time change that was possible, excluding practices with PCC scores at the extremes did not substantially change the overall results (data not shown). Removing CMP control variables also did not measurably change the impact of change in ownership from physician owned to system owned (β = 0.31, 95% CI = 0.08, 0.52, p = 0.010), the impact of increase in practice size (β = -0.43, 95% CI = -0.66, -0.20, p = 0.0004) or the impact of decrease proportion PCP (β = -0.27, 95% CI = -0.038, -0.16, p < 0.0001).

DISCUSSION

There is concern that ownership transitions of medical practices from physicians to large systems may negatively impact practices' responsiveness to patient complaints and feedback (Halley, 2014). Our results indicate that transitions from physician ownership to system ownership are actually associated with *increased* use of strategies to respond to patient complaints, feedback, and develop new services. This improvement may stem from the fact that compared to physician-owned practices, system-owned practices face greater pressure from accreditors and payers to develop a systematic process for receiving and responding to patient complaints. The perception that transitions to system ownership deteriorate practice responsiveness may be common, on the other hand, because increased practice size and changes in specialty composition often co-occur with transitions to systems ownership and these changes can reduce the use of practice strategies to respond to patients.

Our finding that practice ownership transitions do not diminish and may, in fact, modestly increase practice use of strategies to respond to patients, has important policy implications to fostering patient-centered care as the Medicare Access and Children's Health Insurance Program Reauthorization Act of 2015 (MACRA) is implemented ("Education and Tools—Quality Payment Program," n.d.). MACRA establishes value-based payment incentives and quality of care targets which require physicians to assume risk as well as upfront costs. In order to obtain the necessary resources to buffer against risk, physicians have a choice of either a) joining an alternative payment model arrangement and assuming risk for potential losses or b) becoming part of an incentive payment arrangement, which involves meeting quality and cost targets. As practice size is expected to increase under both system ownership and physician ownership under MACRA (Muhlestein & Smith, 2016), it is important to identify strategies that can mitigate the negative impact of this increase in size on the responsiveness of practices to patients.

Results of the individual components of PCC highlight that transitions to system ownership are associated with improved assessment of patient needs, which appears to drive the positive relationship of transitions to system ownership and improved PCC. Improved needs assessment may result from these transitions because systems tend to have more formalized planning of operations and management, including the processing and resolution of patient complaints. Improved needs assessment may also result from the increased consultation and referrals between hospitals and physician organizations within systems that are facilitated by organizational integration (Baker, Bundorf, & Kessler, 2014). Our sensitivity analysis support this proposition because we found that decreases in proportion of primary care practitioners, i.e. increases in the proportion of specialists, is positively associated with use of strategies to assess patients' needs.

Declines in PCC appear to stem from increased practice size and not system ownership, per se. While modest, our results suggest that efforts to centralize resources should give thoughtful attention to retaining a certain level of decentralization. Physician organizations seeking to grow to improve their ability to assume risk may find that fostering local accountability for

responding to patient concerns may be most effective in improving efficiency and quality. This might involve, for example, organizing physicians into pods or teams accountable for managing a defined and consistent patient population. This may help maintain a more personalized and responsive relationships between patients and their medical teams as practices and systems become larger.

Our findings should be considered in light of some limitations. First, the survey data were collected from a single practice respondent. This individual was identified as the most knowledgeable about practice operations but resources were not available to independently assess the validity of the information provided. Second, while we addressed practice strategies for patient responsiveness, future research should also obtain patient assessments and assess the extent to which these strategies are correlated with patient-centeredness. Nevertheless, we believe our data and findings provide insights central to understanding the impact of practice reported use of strategies to respond to patients. Third, selection effects are possible, as practices are not randomly acquired by systems. The selection and acquisition of practices may involve very different strategies for different types of practices in different contexts. To address potential selection, we account for heterogeneity in practice environments by including the Herfindahl-Hirshman Index for county level hospital competition in our models. The sample size precluded the use of other methods to reduce selection effects such as propensity score matching. Despite these limitations, our findings provide the first empirical analysis of practice strategies for patient responsiveness within a large, national, longitudinal cohort of practices such that we can begin to untangle the nuanced and multifactorial impacts of practice characteristics on different aspects of the quality of care.

While we initially hypothesized that changes to system ownership may lead to declines in practice responsiveness to patient concerns, we found that system ownership of a physician organization is associated with increases in the use of strategies for responding to patient feedback. Transitions in practice ownership from physicians to systems, such as hospitals and health care systems, is not in and of itself associated with decreases in the use of these strategies. Practices that are transitioning to system ownership may be able to mitigate the impact of size and specialty mix by being attentive to administrative processes for patient responsiveness and initiating interventions that mitigate any negative effects.

Table 1. Medical Practice Characteristics at Baseline (2006/08) and Over Follow-up (2006/08 to 2012/13), by Ownership Status.*

	Continuously Physician-owned (N=703; 78%)	Physician to System-owned (N=83; 9%)		Continuously System-owned (N=86; 10%)		System to Physician-owned (N=25; 3%)	
Baseline PCC	4.2 (3.8, 4.6)	4.2 (3.6, 4.6)	0.3	4.0 (3.6, 4.4)	0.013	4.2 (3.4, 4.2)	0.048
Change in PCC	0.0 (-0.6, 0.4)	-0.2 (-0.6, 0.2)	0.3	0.0 (-0.6, 0.4)	0.6	0.0 (-0.2, 0.8)	0.043
Baseline Size			<0.0001		<0.0001		0.016
1-2 MDs	382 (54%)	19 (23%)		23 (27%)		11 (44%)	
3-19 MDs	274 (39%)	50 (60%)		44 (51%)		8 (32%)	
20+ MDs	47 (6.7%)	14 (17%)		19 (22%)		6 (24%)	
Change in Size			<0.0001		<0.0001		0.12
Decrease	41 (5.8%)	4 (4.8%)		3 (3.5%)		2 (8.0%)	
Increase	47 (6.7%)	20 (24%)		19 (22%)		4 (16%)	
No Change	615 (87%)	59 (71%)		64 (74%)		19 (76%)	
Baseline Composition			0.10		<0.0001		0.001
100% PCP	478 (68%)	47 (57%)		64 (74%)		17 (68%)	
33-99% PCP	78 (11%)	12 (14%)		18 (21%)		8 (32%)	
<33% PCP	147 (21%)	24 (29%)		4 (4.7%)		0 (0%)	
Change in Composition			0.038		<0.0001		0.021
Decrease PCP	62 (8.8%)	15 (18%)		25 (29%)		5 (20%)	
Increase PCP	14 (2.0%)	1 (1.2%)		1 (1.2%)		2 (8.0%)	
No Change	627 (89%)	67 (81%)		60 (70%)		18 (72%)	
Baseline Medicaid Revenue (%)	5.0 (1.0, 10.0)	5.0 (0.0, 10.0)	0.9	10.0 (5.0, 18.0)	<0.0001	7.0 (0.7, 15.0)	0.082
Change in Medicaid Revenue	0.0 (-2.0, 3.0)	1.0 (-1.0, 5.0)	0.023	0.5 (-3.0, 5.0)	0.057	0.0 (-5.0, 4.3)	0.7
Baseline CMP Index (%)	15.0 (5.0, 30.0)	15.0 (0.0, 35.0)	0.7	20.0 (5.0, 40.0)	0.026	20.0 (5.0, 65.0)	0.10
Change in CMP Index	0.0 (-10.0, 20.0)	5.0 (-10.0, 25.0)	0.2	7.5 (-5.0, 25.0)	0.11	10.0 (0.0, 25.0)	0.079
Baseline HHI	3298 (2049, 5056)	2382 (1960, 4556)	0.079	4199 (2554, 7473)	0.002	3425 (2353, 6241)	0.7

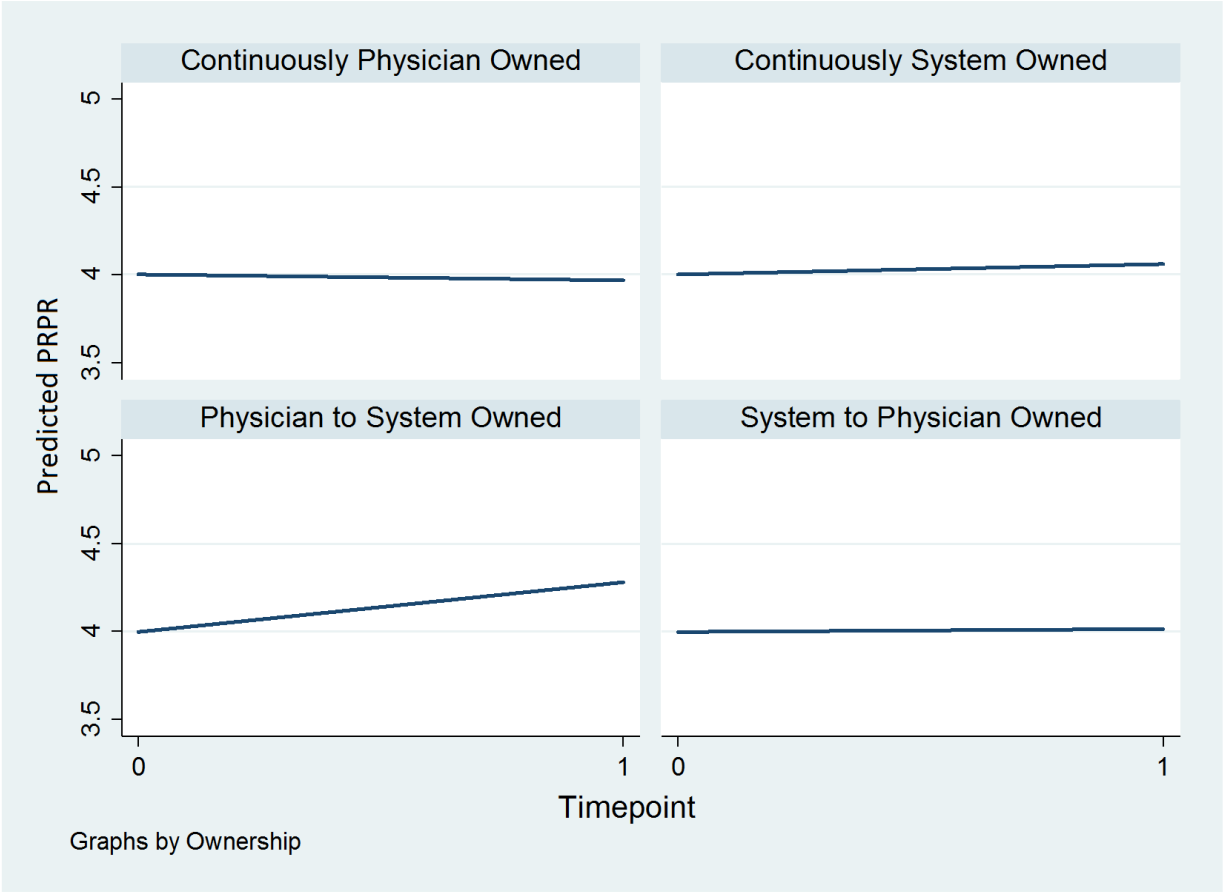
*Data are presented as medians (interquartile range) or frequency (percentages) using Fisher's exact test or Wilcoxon rank sum test, respectively.

Table 2. The Association of Ownership Change on PCC.*

	Coefficient	95% CI	p-value
Ownership			
Continuously Physician-owned	Ref	Ref	Ref
Continuously System-owned	0.10	-0.19, 0.38	0.5
Physician-owned Changed to System-owned	0.31	0.05, 0.57	0.018
System-owned Changed to Physician-owned	0.05	-0.15, 0.24	0.6
Baseline Practice Size			
1-2 MDs	Ref	Ref	Ref
3-19 MDs	-0.17	-0.22, -0.12	<0.0001
20+ MDs	-0.43	-0.69, -0.17	0.002
Change in Practice Size			
No Change	Ref	Ref	Ref
Decrease	-0.19	-0.49, 0.11	0.2
Increase	-0.38	-0.51, -0.25	<0.0001
Baseline Composition			
100% PCP	Ref	Ref	Ref
33-99% PCP	-0.04	-0.18, 0.10	0.6
<33% PCP	0.11	0.06, 0.15	<0.0001
Change in Composition			
No Change	Ref	Ref	Ref
Decrease PCP	-0.25	-0.36, -0.14	<0.0001
Increase PCP	-0.20	-0.73, 0.33	0.4
Baseline Medicaid Revenue per 5%	0.02	-0.00, 0.05	0.10
Change in Medicaid Revenue per 5%	-0.01	-0.02, 0.00	0.10
Baseline CMP Index per 5%	0.07	0.06, 0.08	<0.0001
Change in CMP Index per 5%	0.05	0.05, 0.06	<0.0001
Baseline HHI per 100	-0.00	-0.01, 0.00	0.059
Baseline PCC	-0.83	-0.86, -0.80	<0.0001

*Change in practice-reported patient-centered culture (PCC) ranges from -4 to 4.

Figure 1. Adjusted PCC at Baseline (2006/08) and Follow-up (2012/13), by Ownership Status.*



*Data are as predicted from the main regression model shown in Table 2 for a practice with baseline PCC of 4 on a range of 1 to 5, a constant practice size between 3 to 19 MDs and a constant specialty composition of 33% to 99% PCP.

CHAPTER 3

Meso: Primary Care Team Participation and Patients' Experience of Chronic Illness Care

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INTRODUCTION

More than 50% of the US population have at least one chronic condition and 42% have multiple chronic conditions (Buttorff, Ruder, & Bauman, 2017). People with chronic conditions account for 86% of healthcare expenditure with multiple chronic conditions accounting for the majority of this (Partnership for Solutions, 2004). These numbers are expected to increase with the aging population (Dhingra & Vasan, 2012; Kirkman et al., 2012; Wild, Roglic, Green, Sicree, & King, 2004). In anticipation of the demands of the aging population on the health care system, federal and state initiatives to improve chronic care management have proliferated. For example, the Patient Protection and Affordable Care Act of 2010 (ACA) enabled the creation of accountable care organizations (ACOs) where reimbursement to organizations is tied to quality of care. The Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) likewise emphasized the use of value-based payment models such as the Merit-based Incentive Performance System.

Team-based primary care has been found to improve chronic care management as it improves access to multidisciplinary expertise and decreases demand on primary care physicians (PCPs) practicing in the context of a growing workforce shortage (T. S. Bodenheimer & Smith, 2013; T. Bodenheimer, Wagner, & Grumbach, 2002; Boult et al., 2009; Neil R. Anderson & Michael A. West, 1998; Solberg, Kottke, & Brekke, 1998; E. H. Wagner, Austin, & VonKorff, 1996; Edward H. Wagner, 2000). Team-based interventions to improve chronic care management typically involve delegating responsibilities from physicians to other care team members (Edward H. Wagner, 2000). However, primary care physicians vary in the extent to which they involve non-physician team members before delegating care tasks, which may keep patients from receiving the full benefits of a multidisciplinary team (Institute of Medicine (US) Committee on the Work Environment for Nurses and Patient Safety, 2004; Pearce, 2004). It is unknown whether primary care team participation supports better chronic care management. As ACOs are experimenting with reorganizing team processes to improve quality of care under new value-based payment models, this is an important avenue of research (Lewis, Tierney, Fraze, & Murray, 2019). In this study, we examine whether the participation of primary care team participation is associated with patients' experience of chronic illness care for patients with diabetes and/or cardiovascular disease.

Team participation has been conceptualized in many different ways in the organizational behavior literature (Appelbaum, Dow, Mazmanian, Jundt, & Appelbaum, 2016; Black & Gregersen, 1997; Campion, Medsker, & Higgs, 1993; Cotton, Vollrath, Froggatt, Lengnick-Hall, & Jennings, 1988; Glew, O'Leary-Kelly, Griffin, & Van Fleet, 1995; Sonnentag & Volmer, 2009; Torre-Ruiz, Aragón-Correa, & Martín-Tapia, 2015). We use Alexander et al's definition of team participation (Alexander et al., 2005), which includes seven dimensions: contributing information, interpreting information, being comfortable disagreeing with others, proposing alternatives, evaluating alternatives, feeling free to participate actively, and participating in decision-making.

We hypothesize that team participation is associated with patients' experience of chronic illness care for several reasons. First, patients with chronic conditions and especially patients with multiple chronic conditions produce an overwhelming volume of personal health information (Ancker et al., 2015). Most patients with chronic conditions have multiple chronic conditions so primary care teams need to be aware of potential interactions among multiple management strategies (Buttorff et al., 2017). Primary care teams also need to keep track of changes in the patient's condition or conditions over a long period of time in fluctuating social and environmental contexts. The contribution of information from team members is essential to an accurate shared knowledge in the patient's considerable health information; siloed information can lead to errors as members of the team act from conflicting assumptions on the reasoning behind decisions. Sharing a diversity of knowledge can also lead to new interpretations of the situation which may lead to innovative solutions (Cohen & Levinthal, 1990). Team participation defined in part by the contribution and interpretation of information may thus improve chronic care management.

Second, patients with chronic conditions are often complex cases where health is affected by intricate and often intransigent interactions between the patient, their behavior, their environment, their community, their culture, and their history (Iglesias et al., n.d.; Safford, Allison, & Kiefe, 2007). Effective care of such patients may thus benefit from team participation defined in part by the discussion of alternatives because the presence of minority dissent has been shown to lead to more innovative thinking and creative problem-solving. Even when alternatives are ultimately rejected, the exposure to alternatives enriches the decision-making process as team members consider solutions from multiple perspectives (Nemeth, 1986). Participatory team decision-making can also increase social support for decisions such that each member adheres closely to their part in the plan (Mumford & Gustafson, 1988). For these reasons, we hypothesize that greater team participation is associated with better patients' experience of chronic illness care.

METHODS

Sampling Method

Patient survey and clinical and administrative data from electronic health records were linked to primary care practice survey data from the ACTIVATE study (Shortell et al., 2017), a cohort study of adult patients with diabetes and/or CVD, were analyzed. Two large accountable care organizations (ACOs) participated in the ACTIVATE study: Advocate Health Care in the greater Chicago, Illinois area and HealthCare Partners in the greater Los Angeles, California area. Both are large healthcare systems that participated in the Medicare Shared Savings program, which provides incentives for reducing costs and improving quality.

The ACTIVATE practice survey is a 39-item survey on organizational practices of patient involvement was developed based on prior research and a review of the literature (Shortell et al., 2015). The survey was administered to the clinical or practice leader at each of the 44 practices at Advocate and 27 practices at HealthCare Partners. Respondents indicated the

extent to which the physicians practiced each of the 39 activities, from not at all (0%) to all physicians always (100%). Eight practices from each ACO were randomly selected for the study based on results from the survey: four from the top quartile of the distribution of practice adoption of patient engagement strategies and four from the bottom quartile of the distribution. Within each of the 16 practice sites, all primary care team members were sampled and surveyed between January and March 2015 (baseline). Practice respondents included primary care physicians, nurses, medical assistants, diabetic nurse educators, nutritionists and receptionists.

Within each of the 16 practice sites, adult patients were sampled if they had at least one visit to the practice in the year before each survey, had a diagnosis of diabetes and/or cardiovascular disease, were over 18 years old, and spoke English or Spanish for the purposes of completing the patient survey. Patients (n=273) were randomly sampled from each of the sites and surveyed between April and September 2015 (baseline) and again between May and August 2016 (follow-up).

Analytic Sample

The practice sample included 411 primary care team members (response rate = 82%) who responded to a baseline survey in 2015 with a median of 15 respondents (IQR 11, 24) across the 16 clinics.

The initial patient sample included 2,176 patients who responded to a baseline survey in 2015 (response rate = 51%). During the yearlong follow-up period, 19% of patients switched health plans of practice sites and 15 patients passed away. The remaining patients received a follow-up survey in 2016 to which 1,291 patients responded (response rate = 74%). The final analytic sample includes 1,232 patients that had complete data on key study variables. Comparing patients who had necessary model variables to those who did not, including those lost to follow up, the final patient sample is significantly older, female, with more comorbidities. While the study sample may not be representative of the population from which it is drawn on these variables, we do not expect this selection to impact estimates of the association between team participation and patients' experience of chronic illness care.

Measures

The main predictor variable is team participation at baseline, developed by Alexander et al (Alexander et al., 2005). This 7-item practice-level variable assessed agreement with 7 statements such as, "I frequently contribute information," "I can comfortably disagree with others," and "I frequently participate in making decisions." (See Appendix). Team member responses varied from (1) Disagree to (5) Agree. A composite measure of team participation was calculated for each member (alpha = 0.92; range: 1 to 5) based on the average of their responses(J. C. Nunnally, 1981). Using the half-scale rule, a practice-level composite was then calculated based on the average of each member's responses (J. C. Nunnally, 1981).

To justify aggregation to the practice level, we calculated the rWG index of agreement to assess interrater variability within each practice (Graf-Vlachy, 2017; James, Demaree, & Wolf, 1984; Lindell, Brandt, & Whitney, 1999). Against a null uniform distribution and accounting for the number of respondents, the median rWG across 16 practices was 0.78, above the standard threshold of reliability at 0.7. Only two practices had a rWG below the threshold of 0.7 at 0.59 and 0.69.

Due to the truncated distribution of team participation as a continuous variable in a sample of 16 practices, team participation was also assessed as a binary variable dichotomized at the median for eight practices with low team participation and eight practices with high team participation.

The main outcome variable is patients' experience of chronic illness care at follow-up. This was a patient-level variable assessed using an 11-item Patient Assessment of Chronic Illness Care (PACIC) measure (Glasgow, Wagner, et al., 2005). Patients were asked to indicate their level of agreement with 11 statements such as, "In the last 6 months, when I received care for my chronic condition, I was satisfied that my care was well-organized," and "In the last 6 months, when I received care for my chronic condition, I was helped to make a treatment plan that I could carry out in my daily life." See Appendix for a full description of this measure. Patient responses varied from (1) Never to (4) Always. A composite measure of PACIC (alpha = 0.92; range: 1 to 4) was calculated based on the average of the responses to these statements for patients who responded to at least 6 of the 11 statements (J. C. Nunnally, 1981).

Control variables included comorbidities and health status including emotional (PHQ-4), social (PROMIS SF8a), and physical (PROMIS SF12a) function (Cella et al., 2010; Garfinkel, 2012; Rose et al., 2014). Composite health status measures were calculated for each patient based on the average of each patient's responses to each measure using the half-scale rule(J. C. Nunnally, 1981). A comorbidity count (range = 0 to 15) was calculated as a sum of the number of comorbid medical conditions documented in EHR data, including health failure, atherosclerosis, aortic aneurysm, aortocoronary bypass, hypertension, asthma, emphysema, chronic obstructive pulmonary disease, mood disorders, other nonorganic psychoses, anxiety, adjustment reaction, and depression. To account for ACO-specific effects, an ACO fixed effect was also included to account for the two ACOs included.

Analytic Approach

The relationship of baseline team participation and patients' experiences of chronic illness care at follow-up was estimated using a multilevel linear regression model with patients nested within practices, allowing random intercepts for practice sites where there may be unobserved cultural or structural factors contributing to the perceived care of each patient.

Because patients with worse health status may benefit more from team participation while potentially inclining patients toward a more negative assessment of their chronic illness care, we controlled for number of comorbidities as well as patient-reported function in emotional,

social, and physical domains. Additionally, we controlled for patient age, sex, race, education, English proficiency and insurance status, which may impact patient assessment of chronic illness care.

RESULTS

Team participation at baseline had a median 3.9 (IQR 3.7, 4.1) on a range of 1 to 5. Dichotomizing at this median, eight practices were classified as low team participation and eight practices as high team participation. Practice and patient characteristics at baseline are shown in Tables 1 and 2, respectively. Practices with high team participation had more PCP respondents (34% vs 17%, $p<0.001$) compared to other staff. Patients at practices with high team participation were significantly more likely to be Hispanic (45% vs 19%, $p<0.001$), have dual Medicare-Medicaid coverage (10% vs 4.5%, $p<0.001$), have difficulty with English (24% vs 10%, $p<0.001$), and have more comorbidities (median 6 vs 5, $p=0.028$).

PACIC did not differ significantly between practices with low and high team participation at baseline or follow-up in unadjusted analyses using Wilcoxon rank sum tests ($p=0.5$ and $p=0.2$, respectively) (Figure 1). At baseline, patients at practices with low team participation reported a median PACIC of 2.6 (IQR 2.1, 3.4) whereas patients at practices with high team participation reported a median PACIC of 2.7 (IQR 2.0, 3.5). At follow-up, patients at practices with low team participation reported a median PACIC of 2.7 (IQR 2.0, 3.4) compared to patients at practices with high team participation who reported a median PACIC of 2.8 (IQR 2.1, 3.5).

In adjusted analyses (Table 3), team participation in decision-making was not significantly associated with PACIC as a continuous predictor ($\beta = 0.22$; 95% CI = -0.24, 0.45; $p = 0.5$) or binary ($\beta = 0.02$; 95% CI = -0.16, 0.20; $p = 0.8$). Among control variables, when team participation was evaluated as a continuous predictor, higher social health was associated with lower PACIC ($\beta = -0.08$; 95% CI = -0.14, -0.01; $p = 0.017$). Compared to white patients, Black patients ($\beta = 0.18$; 95% CI 0.004, 0.36; $p = 0.045$) and “Other” patients ($\beta = 0.17$; 95% CI 0.02, 0.32; $p = 0.029$) had higher PACIC.

DISCUSSION

Team participation has been previously been associated with team and organizational performance in many industries including manufacturing, research, and the military (Cotton et al., 1988; Dachler & Wilpert, 1978; Glew et al., 1995; John L. Cotton, David A. Vollrath, Mark L. Lengnick-Hall, & Kirk L. Froggatt, 1990; Katherine I. Miller & Peter R. Monge, 1986; Leana, Locke, & Schweiger, 1990; J. Wagner, 1994). It is becoming increasingly important to examine whether this relationship holds true in the health care organizational context and how it might play out against different measures of performance, as more care is being provided by multidisciplinary teams and pay is being tied to performance measures. In this study, we did not find a significant association between team participation and patients’ experiences of chronic illness care among patients with diabetes and/or cardiovascular disease across 16 primary care practice sites at 2 ACOs. This is in contrast to prior studies in the Veterans Affairs (VA) which

found significant associations between team participation and other measures of performance. Alexander et al found that participation in psychiatric treatment teams at VA hospitals was associated with improved patient function in terms of activities of daily living for patients with severe mental illnesses (Alexander et al., 2005). Among VA primary care clinics implementing the patient-centered medical home model, Helfrich et al found that participative decision-making was associated with improved delivery of patient-centered care as assessed by clinic personnel (Helfrich, Dolan, Fihn, et al., 2014) and decreased employee burnout (Helfrich, Dolan, Simonetti, et al., 2014). To our knowledge, this is the first study to examine the relationship between team participation and patient experience of chronic illness care in non-governmental primary care practices.

One explanation for the non-significance of this association is that patients may experience team-based care as a distraction to the relationship they have with their PCP which may fragment care across team members, placing an addition burden on patients to coordinate and navigate these relationships. In support of this concern, patients have reported feeling lost in the shuffle when treated by multidisciplinary teams (Rodriguez, Rogers, Marshall, & Safran, 2007). So while patients may have more positive experiences of care due to the increased comprehensiveness of the care receive, their overall experience may be negatively influenced by patients' experiences of coordination among care team members. These two effects may work at cross purposes such that team participation does not have the expected positive association with patient experience of care. PACIC includes a dimension on patient perception of the coordination of their care but, in our sample of 1232 patients, assessment of the care coordination dimension of PACIC had a mean of 3.4 with a standard deviation of 0.8 on a range of 1 to 4. This was insufficient variation to explore the differential relationship of team processes with patient experience of care coordination compared to other dimensions of patient experience but will have to be investigated in future research (Glasgow, Wagner, et al., 2005; Gugiu, Coryn, Clark, & Kuehn, 2009).

There are some important limitations to our study. First of all, it was not possible to define team boundaries within each site. All practice respondents at each site were thus considered part of a single team but multiple teams with distinct norms and cultures may exist within each practice site. Important variation in participation may have thus been lost in the development of participation as a group-level variable such that a type 2 error may have occurred where we failed to detect an association which in fact exists. Our results thus apply only to participation as assessed and aggregated to the practice level. Second, the assessment of team participation may be affected compositional differences among practices. Practices classified as practices with high team participation also had significantly more PCP respondents who, as a groups. Lastly, our sample of responding patients was not fully representative of the population from which it was drawn and the two ACOs which comprise the population from which our sample was drawn were not randomly chosen. So results of this study may not be necessarily applicable outside of this particular sample of patients and ACOs.

In conclusion, initiative leaders and implementers should not assume that improving primary care team participation will necessarily be associated with better experiences' of chronic illness

care on the part of patients. Further work is needed on how patients experience different dimensions of team-based care and how these might best be delivered.

TABLES

Table 1. Practice characteristics at baseline shown in frequencies (percentages) and median (interquartile range), using Fisher's exact test and Wilcoxon rank sum test, respectively.

	Low Team Participation (N=269; 65%)	High Team Participation (N=142; 35%)	p-value
Practice Size	28 (20, 61)	18 (12, 28)	0.11
Years at Practice (N=410)			
5 years or less	141 (53%)	74 (52%)	0.2
6 to 10 years	31 (12%)	27 (19%)	
11 to 15 years	29 (11%)	12 (8.5%)	
More than 15 years	67 (25%)	29 (20%)	
Sex (N=407)			
Male	35 (13%)	27 (19%)	0.15
Female	230 (87%)	115 (81%)	
Workgroup			
Diabetes Educator*	5 (1.9%)	15 (11%)	<0.0001
Dietician	3 (1.1%)	1 (0.7%)	
Medical Assistant	94 (35%)	31 (22%)	
Nursing†	53 (20%)	32 (23%)	
Primary Care Provider‡	45 (17%)	48 (34%)	
Receptionist	68 (25%)	11 (7.7%)	
Social Worker	1 (0.4%)	4 (2.8%)	

*RN, Health, Peer.

†RN, RN Care Manager, LVN.

‡MD, NP, PA.

Table 2. Patient characteristics at baseline shown in frequencies (percentages) and median (interquartile range) by practices with low vs high team participation, using Fisher's exact test and Wilcoxon rank sum test, respectively.

	Low Team Participation (N=619; 50%)	High Team Participation (N=613; 50%)	p-value
Age			
Under 45	17 (2.7%)	44 (7.2%)	0.004
45 to 54	78 (13%)	74 (12%)	
55 to 64	160 (26%)	145 (24%)	
65 to 74	234 (38%)	244 (40%)	
Over 75	130 (21%)	106 (17%)	
Sex			
Male	271 (44%)	261 (43%)	0.7
Female	348 (56%)	352 (57%)	
Race			
White	329 (53%)	194 (32%)	<0.0001
Black	102 (16%)	46 (7.5%)	
Hispanic	117 (19%)	277 (45%)	
Other*	71 (11%)	96 (16%)	
Education			
Less than High School	35 (5.7%)	106 (17%)	<0.0001
High School	182 (29%)	186 (30%)	
College	310 (50%)	254 (41%)	
More than College	92 (15%)	67 (11%)	
Insurance			
Private	247 (40%)	229 (37%)	<0.0001
Medicare	16 (2.6%)	5 (0.8%)	
Medicaid	328 (53%)	315 (51%)	
Dual Medicare-Medicaid	28 (4.5%)	64 (10%)	
Difficulty with English	59 (10%)	150 (24%)	<0.0001
Emotional PRF	1.0 (1.0, 1.8)	1.0 (1.0, 2.0)	0.2
Social PRF	2.4 (1.5, 3.0)	2.1 (1.3, 3.0)	0.006
Physical PRF	1.9 (1.3, 2.6)	1.8 (1.2, 2.6)	0.2
Comorbidities	5 (4, 7)	6 (4, 8)	0.028

*Asian, Pacific Islander, Native American.

Figure 1. PACIC at baseline and follow-up for patients at practices with low and high team participation.

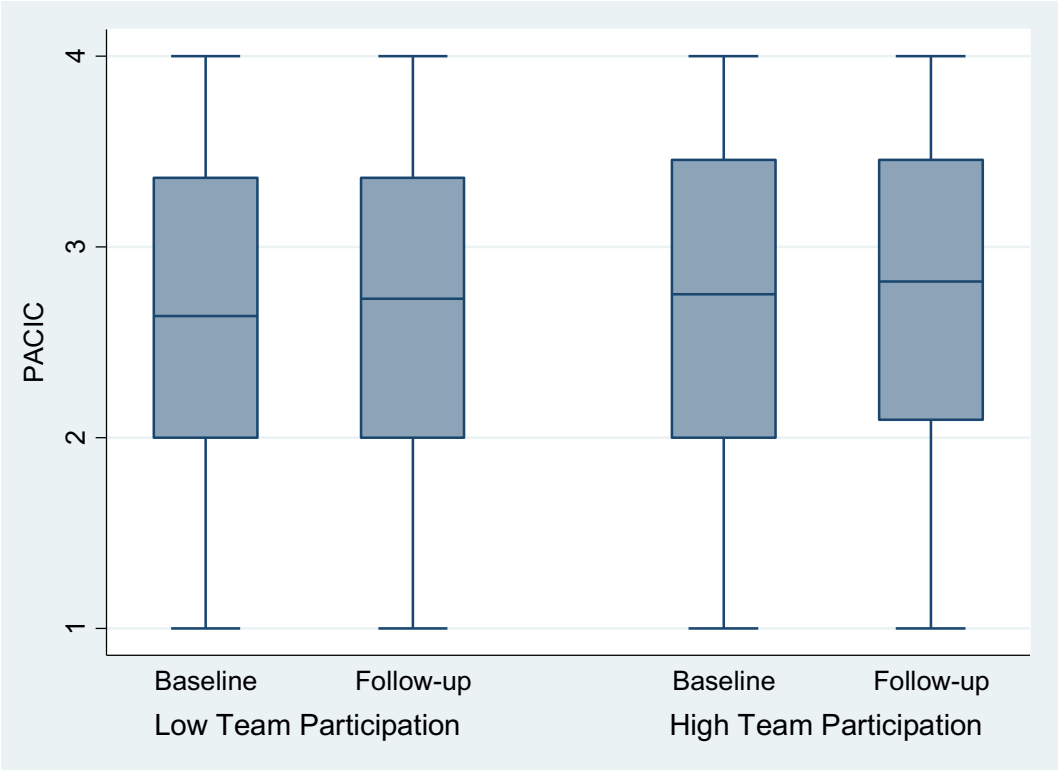

Table 3. Multilevel linear regression of the association between team participation as a continuous predictor and patient assessment of chronic illness care, with random intercepts for practices.

Variable	Coefficient	95% Confidence Interval	p-value
Team Participation	0.11	-0.24, 0.45	0.5
Practice Size per 10	0.01	-0.03, 0.05	0.7
ACO			
Advocate	Ref		
Healthcare Partners	-0.08	-0.27, 0.11	0.4
Age			
Under 45	Ref		
45 to 54	-0.16	-0.40, 0.08	0.2
55 to 64	-0.16	-0.38, 0.07	0.2
65 to 74	-0.11	-0.35, 0.14	0.4
Over 75	-0.14	-0.40, 0.13	0.3
Sex			
Male	Ref		
Female	-0.04	-0.13, 0.05	0.4
Race			
White	Ref		
Black	0.18	0.004, 0.36	0.045
Hispanic	0.13	-0.02, 0.29	0.091
Other*	0.17	0.02, 0.32	0.029
Education			
Less than High School	Ref		
High School	-0.07	-0.28, 0.14	0.5
College	-0.15	-0.38, 0.08	0.2
More than College	-0.18	-0.43, 0.08	0.2
Insurance			
Private	Ref		
Medicare	-0.14	-0.50, 0.22	0.4
Medicaid	-0.06	-0.20, 0.07	0.4
Dual Medicare-Medicaid	-0.10	-0.31, 0.12	0.4
Difficulty with English	0.07	-0.12, 0.26	0.5
Emotional PRF	-0.03	-0.10, 0.05	0.5
Social PRF	-0.08	-0.14, -0.01	0.017
Physical PRF	-0.01	-0.09, 0.07	0.9
Comorbidities	0.02	-0.001, 0.04	0.060

*Asian, Pacific Islander, Native American.

Table 4. Multilevel linear regression of the association between team participation as a binary predictor and patient assessment of chronic illness care, with random intercepts for practices.

Variable	Coefficient	95% Confidence Interval	p-value
Team Participation	0.02	-0.16, 0.20	0.8
Practice Size per 10	0.01	-0.03, 0.05	0.7
ACO			
Advocate	Ref		
Healthcare Partners	-0.06	-0.25, 0.13	0.5
Age			
Under 45	Ref		
45 to 54	-0.16	-0.40, 0.08	0.2
55 to 64	-0.16	-0.38, 0.07	0.2
65 to 74	-0.11	-0.35, 0.14	0.4
Over 75	-0.14	-0.40, 0.13	0.3
Sex			
Male	Ref		
Female	-0.04	-0.13, 0.05	0.4
Race			
White	Ref		
Black	0.18	0.002, 0.36	0.047
Hispanic	0.13	-0.02, 0.29	0.093
Other*	0.17	0.02, 0.33	0.028
Education			
Less than High School	Ref		
High School	-0.07	-0.27, 0.14	0.5
College	-0.15	-0.37, 0.08	0.2
More than College	-0.18	-0.43, 0.08	0.2
Insurance			
Private	Ref		
Medicare	-0.14	-0.50, 0.22	0.4
Medicaid	-0.06	-0.20, 0.08	0.4
Dual Medicare-Medicaid	-0.10	-0.31, 0.12	0.4
Difficulty with English	0.07	-0.12, 0.26	0.5
Emotional PRF	-0.03	-0.10, 0.05	0.5
Social PRF	-0.08	-0.14, -0.01	0.016
Physical PRF	-0.01	-0.09, 0.07	0.9
Comorbidities	0.02	-0.001, 0.04	0.060

*Asian, Pacific Islander, Native American.

CHAPTER 4

Micro: Patient Activation as a Pathway to Shared Decision-making among Adults with Diabetes or Cardiovascular Disease

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INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death in the United States and often co-occurs with diabetes. In combination, these conditions account for 41% of national expenditures (Association, 2018; Benjamin et al., 2017; Meigs, 2010). The effective management of diabetes and CVD depends crucially on treatment adherence (M. Robin DiMatteo, Giordani, Lepper, & Croghan, 2002; Elliott, Maddy, Toto, & Bakris, 2000; Grant et al., 2007; McDermott, Schmitt, & Wallner, 1997), but many patients with diabetes and/or CVD are not adherent to prescribed treatment plans. The mean medication adherence rate among patients with cardiovascular disease across 129 studies was 76.6% while the mean medication adherence rate among adult patients with diabetes across 23 studies was 67.5% (M. R. DiMatteo, 2004).

Shared decision-making (SDM) is a collaborative process in which patients and physicians exchange information about patient preferences and treatment options and tradeoffs to arrive at treatment decisions (Charles, Gafni, & Whelan, 1997; Moumjid, Gafni, Brémond, & Carrère, 2007). SDM for patients with diabetes and /or CVD has the potential to improve adherence because patients are better able to adhere to treatment plans that were collaboratively developed with their physicians, and are more likely to reflect their motivations, abilities, and physical environment (Arbuthnott & Sharpe, 2009). Despite SDM's potential for improving care, not all patients want to engage in medical decision-making (Hamann et al., 2007). Older, less healthy, and less educated patients tend to prefer less active roles in medical decision-making (Benbassat, Pilpel, & Tidhar, 1998) but these same patients are also most likely to benefit from engaging in shared decisions with physicians (Durand et al., 2014).

Patient preferences for engaging in treatment decisions is dynamic and can increase with improved knowledge and self-efficacy, where self-efficacy is confidence in one's capabilities (Joseph-Williams, Elwyn, & Edwards, 2014; Lorig & Holman, 2003). Patient activation, or a patient's self-assessment of knowledge, skills, and confidence to manage their own health (Judith H Hibbard, Mahoney, Stockard, & Tusler, 2005), may be an important precursor to SDM. Patient activation and SDM have both been associated with improved outcomes among patients with diabetes and/or cardiovascular disease (Arbuthnott & Sharpe, 2009; Mosen et al., 2007; Naik, Kallen, Walder, & Street, 2008). Patient activation and patients' experiences of SDM are known to be associated, but the dominant direction of this association is unclear (Parchman, Zeber, & Palmer, 2010; Shortell et al., 2017). In this study, we aim to untangle the temporal relationship between patient activation and SDM among adult patients with diabetes and/or CVD.

We developed hypotheses about the connections between patient activation and patients' experiences of SDM using an interactionist perspective on communication, which stipulates that the clinical encounter is jointly produced by the patient and the physician in a bidirectional relationship (Stewart, 2003). Specifically, we used survey data from adult patients with diabetes and/or CVD to examine the following three hypotheses:

1) *Better baseline experiences of SDM are associated with higher patient activation at follow-up.*
2) *Higher baseline patient activation is associated with better experiences of SDM at follow-up.*
3) *The relationship between patient activation and experiences of SDM is dominated by baseline patient activation.*

METHODS

Data

Patient survey and clinical data linked to practice survey data from the ACTIVATE study (Shortell et al., 2017) were analyzed. Two large accountable care organizations (ACOs) participated in the ACTIVATE study: Advocate Health Care in the greater Chicago, Illinois area and HealthCare Partners in the greater Los Angeles, California area. Both are large healthcare systems that participated in the Medicare Shared Savings program, which provides incentives for increasing patient involvement in care to reduce costs and improve outcomes. A 39-item survey on organizational practices of patient involvement was developed based on prior research and a review of the literature (Shortell et al., 2015). The survey was administered to the clinical or practice leader at each of the 44 practices at Advocate and 27 practices at HealthCare Partners. Respondents indicated the extent to which the physicians practiced each of the 39 activities, from not at all (0%) to all physicians always (100%). Eight practices from each ACO were randomly selected for the primary study based on results from this survey: four from the top quartile of the distribution of adoption of organizational practices and four from the bottom quartile. Differences in the characteristics of practices with high vs. low adoption of patient engagement strategies have been previously described (Rodriguez, Poon, Wang, & Shortell, 2019).

Within each of the 16 practice sites, adult patients were sampled if they had at least one visit to the site in the year before each survey, if they had a diagnosis of diabetes and/or CVD, if they were over 18 years old, and if they spoke English and/or Spanish for the purposes of completing the patient survey. Patients were surveyed between April and September 2015 (baseline) and again between May and August 2016 (follow-up). The institutional review board of the University of California, Berkeley approved the study protocol prior to data collection.

Sample

From an initial sampling frame of 4,368 patients, there was a 51% response rate at baseline with 2,192 non-respondents and 2,176 respondents. Of the 2,176 baseline respondents, 400 switched health plans or passed away, so were excluded. Another 485 patients did not respond to the follow-up survey for a response rate of 73% with 1,291 respondents. The range of baseline patient survey response rates across 16 sites is 38% to 62% with a median of 51% at low adoption sites and a median of 52% at high adoption sites. Among baseline respondents,

the follow-up response rates ranged from 68% to 80% with median of 75% at low adoption sites and median of 73% at high adoption sites. Of the 1,291 respondents, 69 were excluded for missing key study variables. The final analytic sample includes 1,222 patients with baseline and follow-up surveys and data for key study variables. Electronic health record (EHR) data on patient demographics, insurance status and comorbidities were integrated with the survey data. The flowchart for this sample selection process is shown in Figure 2.

Measures

The main independent variable is the short form 13-item Patient Activation Measure (PAM), a measure of patients' skill, knowledge, and confidence in self-management. Patients were asked to indicate their level of agreement with 13 statements, such as, "I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition," "I understand the nature and causes of my health condition," and "I know the different medical treatment options available for my health condition." See Appendix for a full description of this measure. Patient responses varied from (1) Strongly disagree to (4) Strongly agree. As PAM has been well validated as a unidimensional measure (Brenk-Franz et al., 2013; J. H. Hibbard, Stockard, Mahoney, & Tusler, 2004; Judith H Hibbard et al., 2005; Maindal, Sokolowski, & Vedsted, 2009; Rademakers et al., 2016; Rademakers, Nijman, van der Hoek, Heijmans, & Rijken, 2012; Steinsbekk, 2008), a composite PAM score ($\alpha = 0.92$) was calculated based on the half scale rule, where at least half of the items comprising the measure have to be complete in order for a score to be calculated (J. C. Nunnally, 1981).

The outcome measure is patients' experiences of SDM using Elwyn's CollaboRATE measure. Patients were asked to indicate the level of effort made in response to three questions, "How much effort was made to help you understand your health issues," "How much effort was made to listen to things that matter most to you about your health issues," and "How much effort was made to include what matters most to you in choosing what to do next." Patient responses varied from (1) No effort to (5) Every effort. A composite CollaboRATE score ($\alpha = 0.90$) was calculated based on the average of responses to these three questions using the half scale rule.

While CollaboRATE had a high reliability in our sample and is a "fast and frugal" measure that can be easily implemented in practice (Barr et al., 2014), we also assessed our model using the 11-item Patient Assessment of Chronic Illness Care (PACIC) because PACIC is a general measure of the quality of chronic illness care and is more widely used (Glasgow, Whitesides, Nelson, & King, 2005). Of the 11 items, it includes three items on SDM, "I was helped to set specific goals to improve my eating or exercise," "I was helped to make a treatment plan that I could carry out in my daily life," and "I was helped to plan ahead so I could take care of my condition even in hard times." Patient responses varied from (1) Never to (4) Always. A composite PACIC score ($\alpha = 0.91$) was calculated based on the half scale rule.

A comorbidity count (range = 0 to 15) was calculated as a sum of the number of comorbid medical conditions documented in the EHR data, including health failure, atherosclerosis, aortic aneurysm, aortocoronary bypass, hypertension, asthma, emphysema, chronic obstructive

pulmonary disease, mood disorders, other nonorganic psychoses, anxiety, adjustment reaction, and depression. English language proficiency was self-assessed in patient surveys.

Statistical Analyses

We compared patients included and excluded from the analytic sample using Wilcoxon rank-sum tests for categorical variables and chi-square tests for continuous variables. Changes over time in patient activation and patients' experience of SDM were assessed in the final sample using chi-square tests.

The relationship between patient activation and patients' experience of SDM was examined as a cross lagged panel model consisting of simultaneous multivariable linear regressions (Acock, 2013; Allen, 2017). This approach allows for the simultaneous estimation of the association between patient activation at baseline and patients' experience of SDM at follow-up and the association between patients' experience of SDM at baseline and patient activation at follow-up. At baseline, the correlation between PAM and CollaboRATE was assessed through a latent variable. At follow-up, the correlation between PAM and CollaboRATE was assessed though residuals. We controlled for patient age, race, sex, education, insurance, English proficiency, and number of comorbidities. The model was fit using quasi maximum likelihood estimation to account for non-independence of errors within practice clusters (Cam & Neyman, 1967) and practice fixed effects were included to account for time invariant differences between practices. The analyses were conducted using the gsem command on Stata 15.0 (Stata Corp., College Station, TX).

Sensitivity Analyses

We assessed the robustness of our results by restricting the sample to patients who answered all PAM and CollaboRATE items at both baseline and follow-up and re-estimating the model. To check for nonlinearity in relationships conditional on baseline patient activation, we re-estimated the model assessing the moderation of PAM on the path from PAM on CollaboRATE, the path from CollaboRATE on PAM, and the paths connecting baseline values and follow-up values for patient activation and SDM. To assess the robustness of our results when considering multiple dimensions of patients' experiences of chronic care beyond SDM, we re-estimated the model using PACIC in place of CollaboRATE.

RESULTS

Patients included in the sample were more likely to be over 65 (58% vs 51%; p = 0.0001) and female (57% vs 52%; p=0.018) with more comorbidities (mean 5.9 vs 5.5; p = 0.0005) compared to excluded patients (Table 1). PAM levels (baseline mean = 3.27; standard deviation (SD) = 0.45, and follow-up mean = 3.28; SD = 0.45) were high, given a range of 1 to 4. On a scale of 1 to 5, CollaboRATE was also high (baseline mean = 3.62; SD = 1.10, and follow-up mean = 3.63; SD = 1.07).

We find evidence supporting all three hypotheses (Table 2).

1) *Higher baseline CollaboRATE is associated with higher PAM at follow-up (β = 0.04; 95% CI = 0.02, 0.07; p = 0.001).*
2) *Higher baseline PAM is associated with higher CollaboRATE at follow-up (β = 0.35; 95% CI = 0.26, 0.44; p < 0.0001).*
3) *The relationship between patient activation and the SDM process is bidirectional, but it is dominated by baseline patient activation. Compared to the association between baseline CollaboRATE and follow-up PAM, the association between baseline PAM and follow-up CollaboRATE is much stronger.*

The path from PAM at baseline to CollaboRATE at follow-up (solid black) is much stronger than the path from CollaboRATE at baseline to PAM at follow-up (dashed black) (Figure 1). Taking into account the PAM range of 1 to 4 and the CollaboRATE range of 1 to 5, the path from PAM to CollaboRATE is approximately 4 times stronger than the path from CollaboRATE to PAM.

Among control variables, Hispanic ethnicity was associated with lower CollaboRATE scores compared to non-Hispanic white patients (β = -0.23; 95% CI = -0.44, -0.03; p = 0.028).

Results of our sensitivity analyses indicate the main results are robust to alternate analytic decisions (Tables 3-5). First, in analyses restricted to patients with complete PAM and CollaboRATE data, the association between PAM at baseline and CollaboRATE at follow-up remains stronger (β = 0.31; 95% CI 0.22, 0.41; p<0.0001) than the association between CollaboRATE at baseline and PAM at follow-up (β = 0.04; 95% CI 0.01, 0.07; p=0.019). Second, the nonlinear relationship between patient activation and SDM were not statistically significant. Finally, baseline PAM was significantly associated with follow-up PACIC (β = 0.17; 95% CI = 0.08, 0.26; p < 0.0001) and baseline PACIC was significantly associated with follow-up PAM (β = 0.07; 95% CI = 0.05, 0.10; p < 0.0001). The difference in effect sizes between PAM and PACIC, however, is not as large as the difference in effect sizes between PAM and CollaboRATE.

DISCUSSION

We found evidence supporting all three hypotheses: patients' experience of SDM is associated with greater patient activation one year later, patient activation is associated with patients' experience of SDM one year later, and the relationship is dominated by baseline patient activation.

While we examine patient activation as a precursor to SDM, prior studies have primarily focused on the impact of participatory decision-making on patient activation (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002; Parchman et al., 2010). In an observational survey study on 1314 patients with diabetes across 25 Veterans Affairs medical centers, Heisler et al. found evidence that a more participatory decision-making style on the part of the physician can improve patient self-management, mediated by patient confidence in self-management i.e. self-efficacy (Heisler et al., 2002). Similarly, in an observational survey study on 236 patients with diabetes across 5 family physician offices, a physician's participatory decision-making style

was associated with patient's active participation in follow-up visits (Parchman et al., 2010). Our results are consistent with this prior literature as patients' experiences of SDM were positively associated with patient activation approximately one year later.

There is widespread interest in establishing SDM as standard practice, with some calling SDM an "ethical imperative" and "the pinnacle of patient-centered care"(Barry & Edgman-Levitan, 2012; Drake & Deegan, 2009). Accordingly, many decision aids have been developed to encourage patient-centered care by facilitating SDM (Molenaar et al., 2000; O'Connor et al., 1999). Models of the SDM conversation have also been developed with distinct steps and examples to be used in medical education (Glyn Elwyn et al., 2012). However, the routine use of SDM has been slow and its impact mixed (Braddock et al., 1999; Cooper et al., 2003; Ong, de Haes, Hoos, & Lammes, 1995; Shay & Lafata, 2015). Though sharing in decision-making may increase patient readiness for a more engaged role, patients are not all equally ready for SDM. Our results support the proposition that SDM requires personalization from its very implementation.

Our results expand evidence about the connections between patient activation and patient engagement in medical decision-making. SDM requires the active consent of both patients and physicians (Charles et al., 1997) and medical communication in the chronic care context is jointly produced by patients and physicians in multiple encounters over time. Physicians cannot simply impose a participatory decision-making style on patients. Rather, patient engagement in medical decisions shapes and is shaped by their level of activation. Our study is the first to establish the dominant importance of patient activation in this bidirectional relationship between patient activation and patients' experiences of SDM.

This finding is of practical importance to healthcare organizations with interest in improving SDM. Given limited resources, our results suggest that health systems should prioritize patient activation initiatives and target SDM interventions for patients who are relatively activated. SDM is associated with increased patient activation, but it is a patient engagement strategy that is not accessible to all patients. To improve patient activation, healthcare organizations might consider less intensive strategies. For example, patients can be coached to recognize medical decisions and identify the issues that matter most to them in making those decisions. Deen et al developed this approach and found it to effectively improve activation even among patients with low baseline levels (Deen, Lu, Rothstein, Santana, & Gold, 2011). Educational interventions may also be relevant to physicians. For example, Greene et al found that physicians with the greatest increase in activation among their patients demonstrated care for their patients, identified small steps for change, and scheduled frequent follow-ups (Greene, Hibbard, Alvarez, & Overton, 2016).

There are important study limitations to consider. First, cross lagged panel models can make suggestions of causal predominance but any claims of causality are not definitive (Allen, 2017). Second, the two participating ACOs in this study may not generalize to other practices. Future research should examine whether the dominance of patient activation on SDM is consistent in other clinical settings. Third, we were unable to collect data on physician characteristics, in

particular race/ethnicity. Race concordance between patients and physicians is known to impact the communication (Cooper et al., 2003), which could alter these results. Fourth, patient-reported experiences of SDM may reflect their relationships with clinicians other than their primary care physician, as CollaboRATE and PACIC assess patient experiences without specifying specific clinicians. Finally, recorded clinical interactions may elucidate the patient activation-SDM relationship (Roter & Larson, 2002) but the scale required of these methods make them less practical for examining variation across 16 practices.

In conclusion, healthcare organizations seeking to encourage SDM will likely need to broadly invest in improving patient activation and target SDM interventions toward patients with relatively high activation. While educational interventions may hold promise for improving patient activation and ultimately readiness for SDM, additional development, testing, and refinement of patient activation interventions are needed.

Table 1. Patient Characteristics at Baseline.*

	Analytic Sample (n = 1222; 56%)	Not in Analytic Sample (N=954; 44%)	p-value
Age, n (%)			
Under 45	61 (5.0)	95 (10)	0.0001
45-54	151 (12)	127 (13)	
55-64	308 (25)	235 (25)	
65-74	473 (39)	325 (34)	
Over 74	229 (19)	164 (17)	
Gender, n (%)			
Male	526 (43)	459 (48)	0.018
Female	696 (57)	495 (52)	
Race/Ethnicity, n (%)			
White	520 (43)	376 (40)	0.12
Hispanic	390 (32)	342 (36)	
Black	145 (12)	117 (12)	
Other	167 (14)	109 (12)	
Education, n (%) (N=2154)			
Less than High School	139 (11)	129 (14)	0.3
High School	365 (30)	252 (27)	
College	560 (46)	431 (46)	
More than College	158 (13)	120 (13)	
Difficulty with English, n (%) (N=2161)	204 (17)	173 (18)	0.3
Insurance, n (%) (N=2064)			
Private	473 (39)	358 (43)	0.3
Medicaid	21 (1.7)	14 (1.7)	
Medicare	638 (52)	403 (48)	
Medicare-Medicaid	90 (7.4)	67 (8.0)	
Number of Comorbidities, Mean (SD)	5.9 (2.6)	5.5 (2.7)	0.0005
Patient Activation (PAM) at Baseline, Mean (SD) (N=2164)	3.27 (0.45)	3.26 (0.44)	0.3
Patient Activation (PAM) at Follow-up, Mean (SD) (N=1283)	3.28 (0.45)	3.32 (0.40)	0.8
Patients' Experiences of Shared Decision-Making at Baseline, Mean (SD) (N=1283)	3.62 (1.10)	3.47 (1.14)	0.002
Patients' Experiences of Shared Decision-Making at Follow-up, Mean (SD) (N=1265)	3.63 (1.07)	3.16 (1.13)	0.005

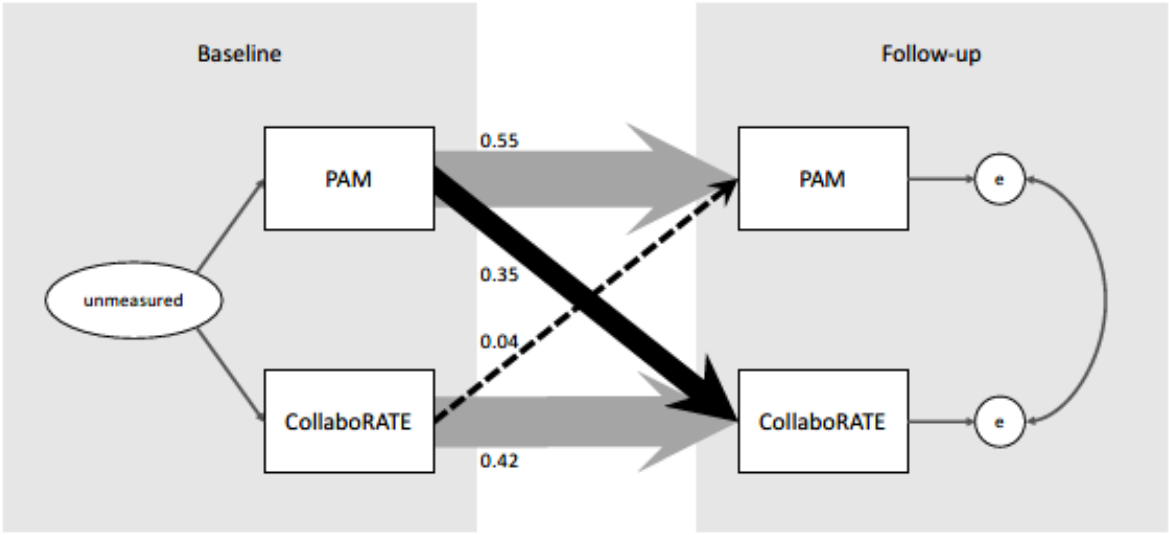
*Data are presented as medians (interquartile range) or frequency (percentages) using Fisher's exact test or Wilcoxon rank sum test, respectively.

Table 2. Adjusted Cross Lagged Panel Model Results for Patient Activation (PAM) and Patients' Experiences of Shared Decision-Making (CollaboRATE) at Follow-up.*

	PAM at Follow-up		CollaboRATE at Follow-up	
	β (95% CI)	p-value	β (95% CI)	p-value
PAM at Baseline	0.55 (0.49, 0.62)	<0.0001	0.35 (0.26, 0.44)	<0.0001
CollaboRATE at Follow-up	0.04 (0.02, 0.07)	0.001	0.42 (0.37, 0.48)	<0.0001
Age				
Under 44	0.07 (-0.04, 0.18)	0.2	0.13 (-0.11, 0.36)	0.3
45-54	-0.08 (-0.17, 0.01)	0.095	-0.13 (-0.31, 0.05)	0.2
55-64	-0.05 (-0.11, 0.02)	0.14	-0.04 (-0.2, 0.12)	0.6
65-74	Referent		Referent	
Over 75	0.001 (-0.04, 0.04)	1	0.08 (-0.05, 0.21)	0.2
Race/Ethnicity				
White	Referent		Referent	
Hispanic	-0.04 (-0.11, 0.04)	0.3	-0.23 (-0.44, -0.03)	0.028
Black	0.06 (-0.03, 0.14)	0.2	-0.05 (-0.25, 0.16)	0.7
Other	0.03 (-0.04, 0.11)	0.4	-0.06 (-0.23, 0.12)	0.5
Sex				
Male	-0.05 (-0.1, 0.001)	0.054	-0.02 (-0.12, 0.07)	0.7
Female	Referent		Referent	
Insurance				
Private	0.08 (-0.01, 0.16)	0.065	0.09 (-0.11, 0.3)	0.4
Medicaid	0.04 (-0.21, 0.3)	0.7	-0.14 (-0.62, 0.34)	0.6
Medicare	Referent		Referent	
Medicare-Medicaid	-0.01 (-0.09, 0.07)	0.9	-0.05 (-0.25, 0.15)	0.6
Education				
Less than High School	0.03 (-0.06, 0.11)	0.5	-0.05 (-0.35, 0.25)	0.7
High School	-0.03 (-0.08, 0.017)	0.2	-0.01 (-0.14, 0.13)	0.9
College	Referent		Referent	
More than College	-0.03 (-0.08, 0.01)	0.2	-0.02 (-0.15, 0.11)	0.8
Difficulty with English	0.05 (-0.04, 0.13)	0.3	0.03 (-0.22, 0.29)	0.8
Comorbidities	-0.01 (-0.02, 0.002)	0.13	0.01 (-0.01, 0.02)	0.5

*Practice fixed effects not shown for ease of presentation.

Figure 1. Cross lagged panel model of patient activation (PAM) and patients' experiences of shared decision-making (CollaboRATE).*



*Adjusted for patient age, race, sex, education, insurance, English proficiency, and number of comorbidities, with fixed effects for practice sites. Path magnitudes are standardized and relative to coefficients.

Figure 2. Cohort chart.

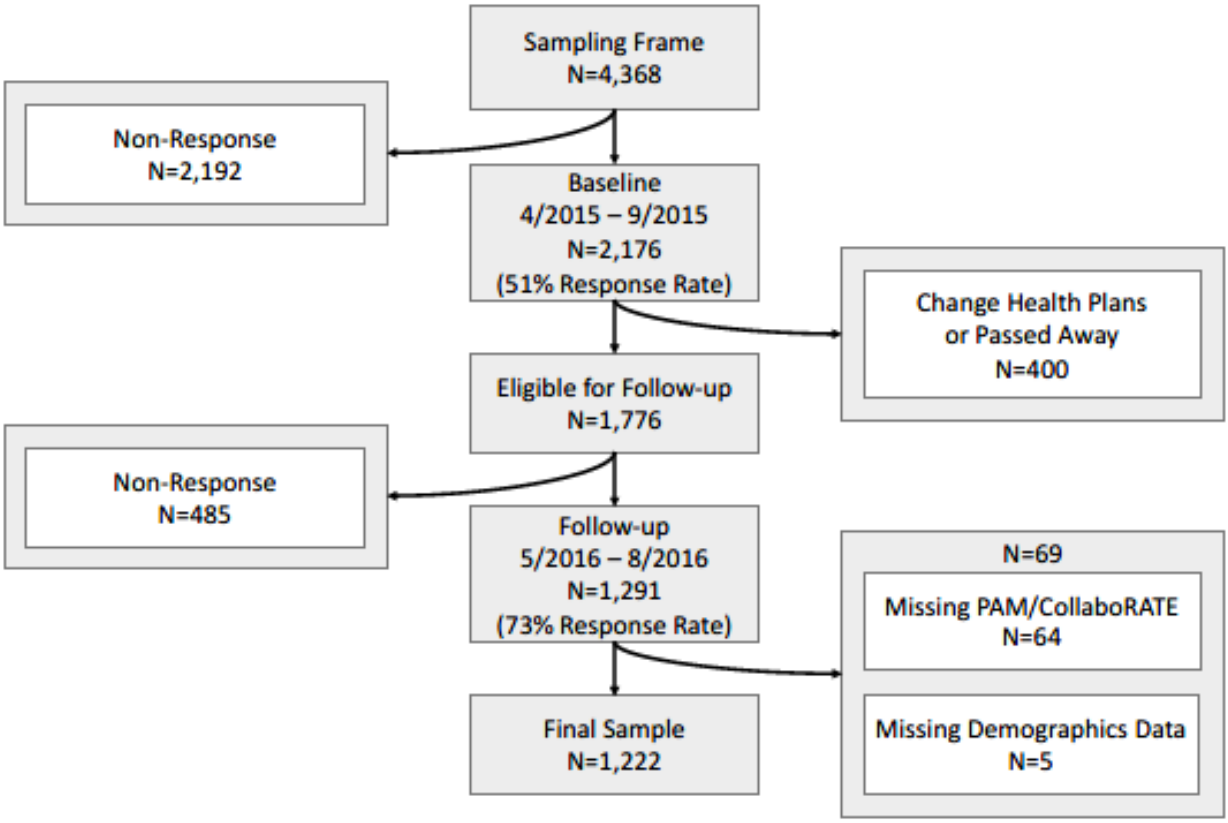


Table 3. Adjusted Cross Lagged Panel Model Results for Patient Activation (PAM) and Patients' Experiences of Shared Decision-Making (CollaboRATE) at Follow-up Among Patients Who Responded to All Items of the PAM and CollaboRATE Measures.*

	PAM at Follow-up		CollaboRATE at Follow-up	
	β (95% CI)	p-value	β (95% CI)	p-value
PAM at Baseline	0.56 (0.50, 0.63)	<0.0001	0.31 (0.21, 0.40)	<0.0001
CollaboRATE at Follow-up	0.04 (0.01, 0.06)	0.013	0.43 (0.36, 0.50)	<0.0001
Age				
Under 44	0.07 (-0.02, 0.16)	0.13	0.09 (-0.15, 0.34)	0.5
45-54	-0.06 (-0.14, 0.03)	0.2	-0.1 (-0.27, 0.06)	0.2
55-64	-0.05 (-0.11, 0.017)	0.2	-0.03 (-0.20, 0.14)	0.7
65-74	Referent		Referent	
Over 75	-0.02 (-0.06, 0.03)	0.5	0.09 (-0.07, 0.25)	0.3
Race/Ethnicity				
White	Referent		Referent	
Hispanic	-0.05 (-0.12, 0.02)	0.2	-0.19 (-0.38, 0.01)	0.063
Black	0.07 (0.01, 0.13)	0.015	0.02 (-0.15, 0.19)	0.8
Other	0.04 (-0.03, 0.11)	0.2	-0.06 (-0.23, 0.11)	0.5
Sex				
Male	-0.06 (-0.1, -0.02)	0.006	-0.03 (-0.13, 0.07)	0.5
Female	Referent		Referent	
Insurance				
Private	0.09 (0.01, 0.18)	0.033	0.10 (-0.10, 0.30)	0.3
Medicaid	0.01 (-0.27, 0.28)	1	-0.22 (-0.76, 0.33)	0.4
Medicare	Referent		Referent	
Medicare-Medicaid	-0.04 (-0.10, 0.02)	0.2	-0.03 (-0.22, 0.16)	0.8
Education				
Less than High School	0.04 (-0.05, 0.13)	0.4	-0.01 (-0.36, 0.35)	1
High School	-0.03 (-0.07, 0.01)	0.11	-0.02 (-0.16, 0.13)	0.8
College	Referent		Referent	
More than College	-0.02 (-0.07, 0.03)	0.5	-0.03 (-0.16, 0.10)	0.7
Difficulty with English	0.04 (-0.05, 0.12)	0.4	-0.06 (-0.32, 0.19)	0.6
Comorbidities	-0.002 (-0.01, 0.004)	0.4	0.0001 (-0.02, 0.02)	1

*Practice fixed effects not shown for ease of presentation.

Table 4. Adjusted Cross Lagged Panel Model Results for Patient Activation (PAM) and Patients' Experiences of Shared Decision-Making (CollaboRATE) at Follow-up with PAM Moderated Paths.*

	PAM at Follow-up		CollaboRATE at Follow-up	
	β (95% CI)	p-value	β (95% CI)	p-value
PAM at Baseline	0.12 (-0.81, 1.06)	0.8	-0.04 (-1.26, 1.19)	1
PAM x PAM at Baseline	0.08 (-0.06, 0.23)	0.3	0.12 (-0.07, 0.32)	0.2
CollaboRATE at Baseline	0.15 (-0.02, 0.31)	0.08	0.80 (0.35, 1.25)	<0.0001
PAM x CollaboRATE at Baseline	-0.03 (-0.08, 0.02)	0.2	-0.12 (-0.26, 0.02)	0.1
Age				
Under 44	0.07 (-0.04, 0.18)	0.2	0.12 (-0.12, 0.35)	0.3
45-54	-0.08 (-0.17, 0.01)	0.081	-0.13 (-0.32, 0.05)	0.2
55-64	-0.05 (-0.11, 0.02)	0.14	-0.04 (-0.20, 0.12)	0.6
65-74	Referent		Referent	
Over 75	0.001 (-0.04, 0.04)	0.9	0.08 (-0.04, 0.21)	0.2
Race/Ethnicity				
White	Referent		Referent	
Hispanic	-0.04 (-0.12, 0.04)	0.3	-0.23 (-0.44, -0.02)	0.03
Black	0.06 (-0.03, 0.14)	0.2	-0.06 (-0.26, 0.15)	0.6
Other	0.04 (-0.04, 0.11)	0.3	-0.05 (-0.24, 0.13)	0.6
Sex				
Male	-0.05 (-0.10, -0.001)	0.047	-0.03 (-0.12, 0.07)	0.6
Female	Referent		Referent	
Insurance				
Private	0.08 (-0.004, 0.16)	0.064	0.1 (-0.11, 0.3)	0.3
Medicaid	0.04 (-0.21, 0.29)	0.8	-0.16 (-0.60, 0.29)	0.5
Medicare	Referent		Referent	
Medicare-Medicaid	-0.01 (-0.09, 0.07)	0.8	-0.05 (-0.26, 0.16)	0.6
Education				
Less than High School	0.03 (-0.05, 0.11)	0.5	-0.05 (-0.36, 0.25)	0.7
High School	-0.03 (-0.07, 0.02)	0.2	-0.01 (-0.13, 0.12)	0.9
College	Referent		Referent	
More than College	-0.03 (-0.08, 0.01)	0.2	-0.02 (-0.15, 0.11)	0.7
Difficulty with English	0.05 (-0.04, 0.13)	0.3	0.03 (-0.23, 0.29)	0.8
Comorbidities	-0.01 (-0.02, 0.003)	0.2	0.01 (-0.01, 0.02)	0.5

*Practice fixed effects not shown for ease of presentation.

Table 5. Adjusted Cross Lagged Panel Model Results for Patient Activation (PAM) and Patients' Assessments of Chronic Illness Care (PACIC) at Follow-up.*

	PAM at Follow-up		PACIC at Follow-up	
	β (95% CI)	p-value	β (95% CI)	p-value
PAM at Baseline	0.54 (0.47, 0.61)	<0.0001	0.17 (0.08, 0.26)	<0.0001
PACIC at Follow-up	0.07 (0.05, 0.10)	<0.0001	0.55 (0.51, 0.59)	<0.0001
Age				
Under 44	0.07 (-0.04, 0.18)	0.2	0.10 (-0.12, 0.32)	0.4
45-54	-0.08 (-0.17, 0.01)	0.095	-0.06 (-0.2, 0.09)	0.4
55-64	-0.05 (-0.11, 0.01)	0.12	-0.04 (-0.14, 0.06)	0.5
65-74	Referent		Referent	
Over 75	-0.003 (-0.04, 0.04)	0.9	0.04 (-0.03, 0.12)	0.3
Race/Ethnicity				
White	Referent		Referent	
Hispanic	-0.05 (-0.13, 0.03)	0.2	-0.05 (-0.13, 0.03)	0.2
Black	0.06 (-0.03, 0.14)	0.2	0.1 (-0.09, 0.28)	0.3
Other	0.02 (-0.05, 0.09)	0.6	0.13 (0.03, 0.22)	0.007
Sex				
Male	-0.05 (-0.1, -0.005)	0.031	0.04 (-0.04, 0.12)	0.3
Female	Referent		Referent	
Insurance				
Private	0.08 (-0.002, 0.16)	0.059	0.06 (-0.09, 0.22)	0.4
Medicaid	0.03 (-0.23, 0.29)	0.8	-0.07 (-0.37, 0.22)	0.6
Medicare	Referent		Referent	
Medicare-Medicaid	-0.01 (-0.09, 0.07)	0.8	0.05 (-0.13, 0.23)	0.6
Education				
Less than High School	0.02 (-0.07, 0.10)	0.7	0.11 (-0.06, 0.28)	0.2
High School	-0.03 (-0.08, 0.01)	0.15	0.03 (-0.07, 0.13)	0.6
College	Referent		Referent	
More than College	-0.03 (-0.08, 0.02)	0.2	0.04 (-0.04, 0.12)	0.3
Difficulty with English	0.04 (-0.04, 0.13)	0.3	0.08 (-0.03, 0.19)	0.2
Comorbidities	-0.01 (-0.02, 0.002)	0.11	0.01 (-0.01, 0.02)	0.4

*Practice fixed effects not shown for ease of presentation.

CHAPTER 5

Conclusion: The Future of Patient-Centered Care

COMPLEX ADAPTIVE SYSTEMS

When care is entered around the patient, health is implicitly if not explicitly understood to be a product of the patient's biological, psychological, and social circumstances, and defined by the patient's values (Stewart, 2003). The patient is not just a physical body where disease sometimes resides. Rather, the patient is a multidimensional person with agency and health an emergent phenomenon across these many dimensions (Sturmberg, 2014).

Patient-centered care must therefore be provided by an open system where healthcare organizations collaborate with other specialties or sectors outside their boundaries to complement their work in supporting the patient's health. Diabetes and depression are conditions that often co-occur, for example, and can be exacerbated by unemployment, food insecurity, or social isolation. Poor dental hygiene can similarly lead to cardiovascular disease as well as difficulties with employment which can in turn impact health. While there is a vast and burgeoning literature on the social determinants of health going back decades, patient-centered healthcare organizations are now starting to develop robust multisector collaborations to address these health factors.

The definition of health is also changes as patients adapt to their fluctuating circumstances and make meaning of their lives (Holcomb, Neimeyer, & Moore, 1993; Park, 2010). In this way, even while payment systems are being rewritten to better align patient goals with financial incentives for clinicians and healthcare organizations, there will always be an extraordinarily high level of goal complexity within healthcare (W. R. Scott & Davis, 2007). Patient-centered healthcare organizations might so be understood as open natural systems as each patient seeks to realize their own interpretation of health within their particular circumstances in alignment with their values and preferences at that moment in time.

We use a complex adaptive systems perspective in particular to understand the future of patient-centered care. Complex adaptive systems can be useful when local factors are too variable for centralized decision-making (Axelrod & Cohen, 2008). There are three levels of particular interest within such a system: the frontline makes decisions about how to achieve the organizational goal, management enables information transfer among the frontline, and leadership creates guiding principles to ensure that the organization has a common orientation. These guiding principles, i.e. the organizational culture, enable the organization to explore a wide range of options for achieving its goal while also exploiting solutions found. Decentralized decision-making within a coherent culture thus avoids both extremes of eternal boiling and premature convergence where eternal boiling is the state of turmoil when solutions are found and discarded too quickly to create any structure and where premature convergence is the state of rigidity when structure is built up around solutions too quickly to allow adaptation.

The concept of complex adaptive systems is not new to organizations and management (P. Anderson, 1999; R. A. Anderson & McDaniel, 2000; Dooley, 1997). It has proven difficult for those in power to relinquish control, however, and patient-centered care in particular has often been thought of as a transfer of power. However, we would argue that the entire medical field

has been struggling with feelings of powerlessness as the biomedical model reached its limits. As payment systems are being reformed to allow greater freedom to address the complex interactions between different aspects of health, patient-centered care will allow and in fact require the empowerment of patients and physicians.

The Patient

The professional dominance of physicians in the medical field has been historically both a bottleneck and a rallying point. Patients have tested their physicians' godlike reputation, perhaps hoping that physicians would rise to the challenge, somehow become all-knowing, all-loving, all-powerful, with an assortment of medical technologies as archangels. Instead, power is being given to the patients as experts on themselves. Without a central guiding authority, patients may feel unmoored or make uninformed decisions (Reed, Graetz, Fung, Newhouse, & Hsu, 2012; Rodriguez et al., 2007). Any honest attempt to engage patients in healthcare must include a plan for providing patients with the resources that they need to make their own decisions about their health and support them in those decisions.

While many patient education interventions also require a high level of engagement, patients don't need to become physicians themselves to take ownership of their health. There are small and simple skills which can be taught. As discussed in this dissertation's micro paper, for example, Deen et al developed an patient education intervention based on principles of empowerment for people unused to advocating for themselves. Patients were taught to recognize medical decisions that need to be made, how they are made, and what issues matter most to them in making those decisions (Deen et al., 2011). These are fundamental skills to becoming an engaged partner in health.

The Physician

Patient-centered care has often been framed as a transfer of power from physicians to patients but the empowered patient does not necessarily mean a disempowered physician. Patient-centered care does take away physicians' power in that they no longer have the authority to decide what health means and the best method to achieve that health (Freidson, 1988). So they cannot command their patients to implement dietary changes and exercise regimens but those commands never had any teeth anyways. While patients may have been more inclined to follow physician orders under a paternalistic culture of care, they lacked the support needed to carry through. Physicians have felt exceedingly powerless as rates of non-communicable conditions continue to rise, unable to compel their patients to follow their directives. Their authority thus was mostly symbolic in the absence of power. Physicians usually did not receive training in behavioral change and often did feel that they had the opportunity to learn in practice operating under intense time pressure (Astin, Soeken, Sierpina, & Clarridge, 2006; Waldstein, Neumann, Drossman, & Novack, 2001). Physicians might learn how to foster psychological safety and improve communication when working with a team but, as we found in the meso paper of this dissertation, team participation does not necessarily translate to

better communication with the patient. What physicians stand to lose in culturally derived power then, they stand to gain in knowledge-based power.

Physicians will need to learn how to ask questions which is, like patients learning to recognize decisions, much more difficult than it sounds (Schein, 2013). In the United States and many other countries, we often listen to tell rather than to understand. Even when we ask, we often ask to confirm rather than to explore. Physicians have not had the time to employ these techniques but these skills have also been considered mere niceties in the hidden curriculum of medical education. Conversation must be taught as an extraordinarily difficult skill, with the potential to improve understanding, establish connection, and change behavior.

Relatedly, physicians need to learn how to influence their patients. This is not a holdover from the paternalistic model of care but a crucial part of empowering patients. Understanding how patients make decisions about their lifestyle lets physician help them make the changes that they want to make. Medical education will need to incorporate motivation techniques and the psychology of habits so that physicians don't just learn how psychosocial dynamics play into health but also how to influence them.

Further, just as patients need to be empowered to adapt medical decisions to their local circumstances, physicians need to be empowered to adapt organizational initiatives to their local circumstances. As healthcare organizations have grown ever larger in an effort to attain economies of scale, physicians have often felt powerless against the rising tide of bureaucracy.

Management

When patients and physicians need to be empowered to realize patient-centered care by making their own decisions, the role of management is to support frontline decision-making while still ensuring efficiency. If people only solved their own problems, they may not be aware of better solutions that exist. If people were handed down solutions, they may not be flexible enough to fit local conditions. Management's role in this context is to facilitate information transfer in a way that meets the needs of those at the frontline.

This is not an inconsiderable challenge as clerical burden is a leading cause of physician burnout (Shanafelt et al., 2012). Realizing patient-centered care will require creativity and restraint in deciding what information to capture and how. Ideally, physicians should be involved in designing the interfaces for electronic health record to improve relevance and workflow as well as ownership and empowerment.

Another leading cause of physician burnout is time pressure and productivity demands. The push towards improving quality and controlling costs has understandably put pressure on the system as a whole. But productivity is not indicative of the quality of care and certainly not the patient-centeredness of care. Physicians need time to have deeper conversations with their patients. While some aspects of healthcare organizations can be centralized for efficiency, relationships cannot. As suggested in the macro paper of this dissertation, creating modular

practice units within healthcare organizations may help maintain patient-physician relationships without reducing patients' access to care.

Shared medical appointments may be another way to leverage complexity for improved adaptation. Shared medical appointments is a way of structuring medical appointments where a physician and a care team meet with a group of patients with similar health conditions. Shared medical appointments are a challenge to implement due to scheduling complexity, prevailing norms, and legal requirements, but it is an opportunity for physicians to spend an hour or more with patients. Although the time per patient is the same as it would have been seeing each patient individually, the shared appointment decreases the physician's need to lecture on health education repeatedly and in futility. Rather, physicians are able to use the time saved to explain health conditions in greater detail and consider each patient's particular circumstances. This has the potential to improve feelings of meaning, effectiveness, and satisfaction which are protective against burnout. Patients, listening to one another, are also granted the opportunity to learn from one another and consider whether the strategies that worked for somebody else might work for them too. In this way, management can facilitate information transfer among patients without making assumptions about what information needs to be collected and disseminated.

Leadership

When the frontline is empowered to solve problems for themselves and management is facilitating information transfer to support that behavior, what role does leadership play? Leadership establishes the culture that coordinates all this decentralized decision-making. Control of the organization does not come from directing people's behavior but instilling the values that guide their decisions. The more that people are given control over their own behavior, the stronger that culture needs to be.

FUTURE RESEARCH

This dissertation began with the image of the patient and physician sharing in decision-making but we end with the image of the empowered individual. Patients and physicians cannot engage in shared decision-making unless each is empowered to make decisions. Empowerment then determines the structure of the whole system, a complex adaptive system, from the micro level to the meso and the macro. Organizational theory has a rich intellectual history of employing analogies in describing organizations. The analogy here is that of a simple cell. The patients, external to the organization, and the physicians, internal, form the membrane of the cell. Each patient-physician dyad together makes decisions. It is in this way semi-permeable, neither making unilateral demands on the other. Management is the matrix of the cell, sharing information among patients and physicians. Leadership forms the nucleus where the DNA of the organization is determined. Future research will be needed to examine the strength of this analogy and its implications, such as suggested in this chapter.

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Appendix

Table 1. Measure items for the Patient Activation Measure (PAM).

Measures	Measure Items
PAM: Hibbard's validated 13-item patient activation measure from (1) strongly disagree to (4) strongly agree on the following statements.	1. When all is said and done, I am the person who is responsible for managing my health condition. 2. Taking an active role in my own health care is the most important factor in determining my health and ability to function. 3. I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition. 4. I know what each of my prescribed medications does. 5. I am confident that I can tell when I need to go get medical care and when I can handle a health problem myself. 6. I am confident that I can tell my health care provider concerns I have even when he or she did not ask. 7. I am confident that I can follow through on medical treatments I need to do at home. 8. I understand the nature and causes of my health condition. 9. I know the different medical treatment options available for my health condition 10. I have been able to maintain the lifestyle changes for my health that I have made. 11. I know how to prevent further problems with my health condition. 12. I am confident I can figure out solutions when new situations or problems arise with my health condition. 13. I am confident that I can maintain lifestyle changes like diet or exercise even during times of stress.

Table 2. Measure items for CollaboRATE.

Measures	Measure Items
CollaboRATE: Elwyn's validated 3-item CollaboRATE where patients report their providers' effort from (1) no effort to (5) every effort.	1. How much effort was made to help you understand your health issues? 2. How much effort was made to listen to things that matter most to you about your health issues? 3. How much effort was made to include what matters most to you in choosing what to do next?

Table 3. Measure items for Patient Assessment of Chronic Illness Care (PACIC).

Measures	Measure Items
PACIC: Glasgow's validated 7-item PACIC from (1) never to (4) always.	1. I was given choices about treatments to think about. 2. I was satisfied that my care was well-organized. 3. I was helped to set specific goals to improve my eating or exercise. 4. I was given a copy of my treatment plan. 5. I was encouraged to get a specific group or class to help me cope with my chronic condition. 6. I was asked questions, either directly or on a survey, about my health habits. 7. I was helped to make a treatment plan that I could carry out in my daily life. 8. I was helped to plan ahead so I could take care of my condition even in hard times. 9. I was asked how my chronic conditions affects my life. 10. I was contacted after a visit to see how things were going. 11. I was told how my visits with other types of doctors, like an eye doctor or surgeon, helped my treatment.